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AND
SCIENTIFIC AND LITERARY REVIEW,

A RECORD OF PROGRESS IN ARTS, INDUSTRY, AND MANUFACTURES,
INCORPORATING THE
Journal of the Inventors' Institute.

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THE INVENTORS' INSTITUTE

4, ST. MARTIN'S PLACE, TRAFALGAR SQUARE.

Chairman of the Council—**SIR ANTONIO BRADY.**

THE various efforts which have been made, and the numerous influences now at work to injure, if not to destroy, Patent Rights; the inefficiency of the many well intended, but ill considered, schemes of Patent Law Reform which have from time to time been suggested, and the tendency of which has generally been to prejudice the Inventor, without advantage to the Public; together with the proceedings so essentially involving the interests of inventors which have already taken place in Parliament, show the necessity of an immediate and active co-operation on the part of those interested in Inventions and in Patent Property, and that an Association for the Protection and Defence of Patent Rights is urgently needed. This Institute has, therefore, been established for the purpose of uniting and organizing the influence of Inventors, Patentees and others. Its objects are:—

1st. To protect Inventors' interests and defend the privilege of obtaining her Majesty's Letters Patent.

2nd. To promote improvements in the Patent Laws.

3rd. To facilitate the diffusion of information with reference to Inventions and other subjects beneficial to Inventors and Patentees.

The qualification for Annual Members of the Institute is a yearly Subscription of One Guinea, and for Life Members a single payment of Ten Guineas.

Persons desirous of becoming members are requested to forward their names and addresses to the Secretary.

THE
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LIMITED,
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Objects of the Association.

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To Sell and License Patented Inventions.
To form Public Companies, or otherwise arrange for the Public Introduction of Patented Inventions.
To furnish advice and Professional Assistance in developing Inventions.
To collect Evidence, arrange Arbitrations, and otherwise assist Inventors in maintaining their rights.
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THOMAS MORGAN,
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Recently Published, price 2s.,
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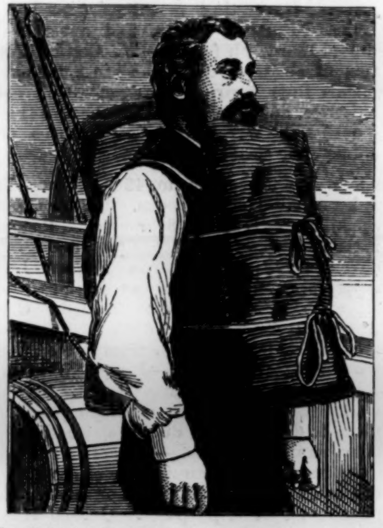
ARTHUR WOODS'
PILLOW LIFE PRESERVERS,
For the use of Crews and Passengers of Steam and Sailing Vessels, Yachts, &c., in case of Collision, Wreck, Stranding, or other Accident.



The Patentee begs to call the attention of all Shipowners, especially owners of Passenger Ships, to his Patent Pillow Life Preservers, and to solicit a trial.
The Patent consists of two Pillows, which are used as ordinary Pillows in a general way, but which can be made available for saving life if required. They are fitted with tapes to sling them over the head and tie round the body—one Pillow on the chest and the other on the back. The above Illustration shows the way in which the Pillows are attached to the person. The Pillows being made of a very buoyant material, act as a Life-buoy in case of danger, and the advantages are so manifest that they merely require to be enumerated, as follows:—
1.—The ease and rapidity of attaching them to the person.
2.—The perfect buoyancy of the person when in the water—a pair of these Pillows being capable of supporting a man of 20 stone breast-high.
3.—The protection they afford from floating wreck or dashing against rocks, &c.
4.—The fact that by reason of being tied to the person there is no occasion for holding on to them as to a common Life-buoy.
5.—The Pillows being lashed the narrow way across the chest and back, they do not interfere with the action of the arms in any way, and a person could swim, haul a rope, or pull an oar, without the slightest inconvenience.
6.—The slight cost is another feature—because the two Pillows being placed at the head of the mattress make the mattress so much shorter and consequently cheaper.
7.—These Pillows can be used as Boat Cushions at watering-places, and, in the event of a person falling overboard, or the boat upsetting, used as Life-buoys.
PRICES ACCORDING TO QUALITY.
Application to be made to the Agents,
A. BLAIN & SON, 35, Paradise-street, Liverpool,
WILLIAM JONES, Ship Flag Maker, 14, Bath-street, Liverpool.
SOLE AGENTS FOR LONDON,
S. W. SILVER & Co., Cornhill, E.C.
For Estimates address the Patentee,
ARTHUR WOODS, 352, Westminster-road, Kirkdale, Liverpool.

APPLICATIONS FOR LETTERS PATENT.

*** In this list (Com.) means Invention communicated from abroad.

Further information, as to the progress of these Patents by Notice to Proceed, Sealing, and Specifying, can be obtained at the Office, 21, Cockspur-street, Charing Cross.

On February 1st.—366 to 374.—J. Elce. Machinery for preparing, spinning, and doubling cotton and other fibres.—J. M. Clements. Sewing machines, embroidery stitches apparatus, treadles, and means of controlling the same when in action.—J. Shaw. Steam boilers.—J. Bath. Means or apparatus for coupling railway carriages to prevent either of them from leaving the rails in case of accident.—W. Stark. Apparatus for breadthening and drying woven or other web fabrics.—C. Hodson. Floor, sash, and bench cramp.—H. Hughes. Steam engines.—H. Y. D. Scott. Manufacture of manures.—A. H. Cramp. Device to be used in the marking and cutting of textile and other like materials.

On February 2nd.—375 to 386.—W. Wilson and J. Battersby. Machinery for slicing, cutting, and pulping turnips and other roots, partly applicable to other machinery worked by hand.—H. Handyside. Manufacture of chains or cables and the apparatus connected therewith.—H. H. Share and S. Calley. Apparatus for raising, securing, and lowering ships' boats and other boats or vessels.—J. B. Buckley and E. Stock. Double and single sealing stench traps.—W. Read. Buttons, and the mode or method of attaching same to wearing apparel, boots. shoes, and other articles.—J. F. Wilkinson. Obtaining motive power.—J. H. Johnson. Treatment of farinaceous substances for the manufacture of starch and fermented and distilled liquors (com.)—A. W. Murray. Lamp for paraffin and the kindred oils.—F. W. Rider and H. Hutchence. Pedal harmoniums or organs, such invention being also applicable as a music stool.—T. A. Edison. Duplex and multiplex telegraphs.—A. V. Newton. Bullet patching machinery (com.)—Rev. J. Gilmore. Apparatus for turning over the leaves of music.

On February 3rd.—387 to 410.—G. Stevenson. Machinery to be used in mining and quarrying, parts of which are also applicable to steam engines and to air-blowing or compressing engines for other purposes.—M. Benson. Apparatus for interchangeably performing the operation of freezing ice-cream, churning, beating eggs, and for similar purposes (com.) (Complete specification.)—J. Bradley and J. Walbank. Method of and apparatus for stopping spinning frames when the bobbins are at any degree of fulness. — Count de G.

de Liancourt. Apparatus for the preservation of life at sea, named "the raft." T. Temple. Means for coupling and working continuous railway brakes.—S. Hughes and J. Turner. Lamp burners.—R. Holland. Fastening the tyres of railway wheels.—W. H. Beck. Saddle girths for horses (com.)—W. R. Lake. Machinery for brushing boots and shoes, and for polishing, grinding, and sharpening cutlery (com.)—J. Atherton. Joints or couplings for pipes or tubes.—T. Hutchinson and G. G. Humphreys. Embroidering or ornamenting textile or other fabrics.—J. Russell and G. Dominy. Guards for carving-forks and means or appliances connected therewith for retaining such guards in an upright position without springs.—G. Rydill. Process of and apparatus for treating and purifying sewage and polluted waters, which are applicable for collecting the soap, grease and oils for the manufacture of gas, and for removing incrustation in steam boilers.—R. Johnson. Machinery for obtaining motive power for raising, forcing, and exhausting fluids and liquids, and for measuring liquids. —J. Tomlinson. Machinery for preparing cotton and other fibrous substances.—C. Neil. Construction of stocks and dies for cutting screws.—G. Bishop. Stand for exhibiting photographic pictures (com.)—W. Clark. Construction of ships or vessels with the object of saving life at sea (com.)—A. L. Fyfe and C. Harris. Ladies' dress improvers.—M. Wilcox. Combined seal and watch key.—H. B. Barlow. Apparatus for regulating and indicating the level of water in steam boilers, and for sounding an alarm (com.)—J. H. Johnson. Treatment of saccharine solutions (com.)—J. H. Johnson. Application of combustible compositions to signalling and illuminating purposes, and the apparatus employed therein (com.)—J. Mitchell and W. Mitchell. Umbrellas and parasols.

On February 4th.—411 to 430.—J. Sheffield. Furnaces used in the manufacture of glass.—J. C. Haddan and H. Smith. Carving forks.—W. Dennis. Apparatus for regulating and governing the motion of sewing and other machines.—S. Cottrill. Apparatus for working railway signals.—J. Maclaren. Watch protector.—E. Chaquette. Machine for holding, turning, and shearing sheep, including also improvements in sheep-shearing implements adapted to this and other sheep-shearing machines. (Complete specification.)—E. A. Chameroy. Cocks for water, steam, air, or gases.—J. Wadsworth. Stoppers for bottles containing aërated waters. A. Munn, J. Rennie, and J. Sutherland. Sinking of cylinders for foundations, and the machinery or apparatus therefor.—H. Loewenberg. Manufacture of imitation braids, trimmings, leather, wood, and other articles.—P. Adie. Apparatus for clipping horses.—G. Haseltine. Balanced slide valves (com.) (Complete specification.)—R. Theiler and F. Higgins. Register clocks.—T. Reeves. Construction of sewing machines.—E. E. Crombie. Dry gas meters.—C. Turner. Couplings, more especially applicable for repairing broken shafts.—H. G. Spence. Arrangements for connecting the various pipes, cocks, and valves to the bottoms and sides of ships or vessels with the view to afford greater safety to ships and vessels.—J. Hall and D. Hall. Self-acting temple for looms.—A. S. Cameron. Steam engines.—G. Porter, jun. Gas burners.

On February 5th.—431 to 447.—T. Redfern, P. Smith, and J. H. Law. Jacket stretcher for paper makers.—J. Baker. Warehouse hoists or cranes.—W. E. Gedge. Asphaltic fabric for roofing and for other purposes (com.)—W. E. Gedge. Quilted fabric for covering steam-engines, and for other purposes (com.)—T. Rawsthorne. Automatic self-stripping motion for dirt or other rollers in carding engines.—S. Puente. Shears for shearing sheep.—M. Benson. Rubber or elastic boots, and lasts for making the same thereon (com.) (Complete specification.)—H. A. Dufrené. Horse collar (com.)—F. Wirth. Valves (com.)—J. Flachfeld. Pencil or instrument for writing, drawing, and marking (com.)—S. A. Kosloff. Production of electric light and apparatus therefor. —C. Stuart. Stop valves and taps.—A. J. Tatum and W. A. Roberts. Machinery or apparatus for driving or working sewing machines.—G. Halley. Machinery for the manufacture of nut blanks.—J. H. Johnson. Manufacture of bread (com.)—W. H. Stokes. Breaks for railway and other carriages, waggons, and trucks.—R. Pounsett. Manufacture of vinegar, and apparatus to be used in the said manufacture.

On February 6th.—448 to 464.—R. P. Pope. Trapping apparatus for trapping water-closets and other places to prevent the passage of effluvia.—E. Tyer. Galvanic batteries.—W. Smith. Method of and apparatus for blowing glass.—P. Boucley. Manufacturing straps, bands, harness, ropes, pipes, or other articles. —H. G. Gouverneur. Reeds for harmoniums and other similar free reed instruments.—H. G. Gouverneur. Reeds for harmoniums and other similar free reed instruments.—L. O. Thayer. Breech-loading fire-arms. (Complete specification.)—W. A. Lyttle. Means and apparatus for manufacturing alkali, which are partly applicable to other purposes.—A. Ure. Modes and means for smelting ores and metals.—J. Lind. Fastening for securing the ends of metal bands used in packing cotton bales and other bale goods.—G. Shann. Arrangements or constructions of steam traps.—L. Webster. Machinery for "milling" or "fulling" fabrics. H. Vollmer. Copying ink pencil (com.)—S. L. Harrison. Axles for railway cars and carriages. (Complete specification.)—F. W. Webb. Mechanism or arrangements for actuating railway points and signals.—W. Clark. Sewing machinery applicable for the manufacture of straw hats and bonnets and for other purposes (com.)—W. C. Kritch. Machinery or apparatus for cutting paper.

On February 8th.—465 to 474.—S. Bury. Construction of self-acting temples used in weaving. —J. Smith. Mechanical stoking apparatus for boiler and other furnaces.—F. A. Greenwood. Machinery employed in spinning silk, cotton, wool, and other fibrous substances.—T. Martin. Lamps.—W. J. Holroyde. Grapples for dredgers.—J. H. Cooper, T. A. W. Clarke, and E. Corah. Knitting machines.—W. R. Lake. Harvesting machines (com.)—W. R. Lake. Furnace grates, and apparatus connected therewith (com.)—W. Clark. Application of electro-dynamic machines for obtaining metals from their salts, regenerating galvanic batteries, and obtaining other chemical reactions (com.)—T. W. Wilson. Apparatus or machinery for cleaning bottles.

On February 9th.—475 to 486.—Henry Brooks. Inkstands.—Henry Brooks. Call or signal bell apparatus.—Gustav Schrebler. Pistons for rotary engines and pumps, and cylinder covers for same.—William Samuel Laycock. Applying breaks to railway engines and carriages.—Honoré François Adolphe Cordillot. Apparatus for steaming printed fabrics.—Christopher Bradley and John Campbell. Combing wool and other fibres.—Joseph William Lee. Rotary pumps.—Thomas Jones. Rendering timber for building and other purposes impervious to dry-rot and decay, also rendering the same uninflammable.—Cornelius Devenport. Construction and manufacture of crotchet hooks and handles, to be used single or duplex, also applicable for other purposes.—George Haseltine. Apparatus for filling bottles with liquids and for corking the same (com.) (Complete specification.) —George Haseltine. Rock-drilling machines, parts of which invention are applicable to other machinery (com.) (Complete specification.)—William Robert Lake.. Producing imitations of leather and textile and other fabrics or materials (com.)

On February 10th.—487 to 502.—Andrew Clark Whyte. Apparatus or means for saving life from shipwreck.—Emile Trottier. Removing grease in the manufacture of tin-plates or terne-plates. —John Reed Heard. Manufacture of horse shoe and other nails (Complete specification.) —Leon Vallet. Stoppers for bottles for containing aërated or gaseous liquids.—Robert Swarbrick. Construction of fireproof flooring. —Harry Langston Jones. Solid and liquid disinfectants and deodorizers.—William Middleton and Philip Hayward. Apparatus employed in melting, refining, converting, and puddling iron.—Peter Jensen. Painter's easels.—Samuel Cole. Compositions for making inkstands, picture-frames, watch-stands, black and coloured jewellery, and ornaments, dress-fastenings, and other articles.—Mary Weldon Daw. Additions to scissors.—Robert Aspland Marillier. Apparatus for raising, tipping, and lowering trucks. —Thomas Holliday. Operating with indigo in the printing of cotton and other fabrics (com.) —Thomas Holliday. Bleaching of cotton and other fabrics produced from vegetable fibres (com.)—George James Snelus. Extracting copper, silver, and other metallic compounds from solutions, and for separating the metals. —Henry Joseph Petit. Sewing-machines.—Bernard Ackerman. Preparation of fertilizer

On February 11th.—503 to 514.—William Kirby. Coffins.—Marshall Arthur Weir. Apparatus for measuring the flow of liquids.—Wilhelm George Brunner. Self-acting counter-balancing apparatus for portable cranes (com.)—Peter Jenson. Increasing the adhesion of locomotive wheels on rails (com.)—James Broadfoot. Water-closets.—George Reston Wood. Steam boiler and other furnaces.—William Nelson Hutchinson. An improved stirrup.—William Palmer Jones. Breech-loading fire-arms.—Christopher James Schofield. Improvements in furnaces, and apparatus connected therewith, for the manufacture of alkalies, the puddling of iron, the roasting of ores, and other purposes.—Albert Dumont and Eugéne Alfieri. Construction of lockets —Charles Clinker. Improvements applicable to printing machines.—Josiah Latimer Clark and John Standfield. Floating docks and pontoons, and blocking or securing vessels.

On February 12th.—515 to 528.—F. B. Dignum. Breakers for boats.—D. R. Pearson. Toilet brushes.—W. Crawley. Ships for the purpose of preventing sea sickness.—R. Milburn and H. Jackson. Method of and apparatus for drying, calcining, roasting, or incinerating soda-ash, sulphate of soda, and carbonate of potash and ores of sulphur, copper, zinc, and lead, and applicable also in the treatment of other salts, ores, and substances.—T. Terrell. Manufacture of tin plates.—H. N. Smith. Apparatus for heating water for baths or for other purposes. —S. J. J. Kelly. Producing letters or other devices upon glass.—M. Kosminski. Certain articles for dress for ladies.—T. N. Laslett. Instruments for measuring the heights and distances of objects.—R. Howland. Combination of perpetual almanacs or calenders with pencil-cases, pen-knives, and other articles of utility.—G. Allan and J. W. Brown. Electric telegraphs. —W. Boggett. Production of ornamental designs, and ornamenting surfaces.—T. Atkins. Apparatus for ventilating railway and other carriages, ships, buildings, warehouses, and drains, or sewers.—L. Weill and H. Harburg. Musical boxes, and other similar instruments (com.)

On February 13th.—529 to 541.—T. Vicars, the elder, T. Vicars, the younger, and J. Smith. Self-stoking furnaces and steam generators.—W. J. Hall, F. A. Marshall, and C. W. Skinner. Feed-heaters for boilers.—J. Kidd. Manufacture or production of gas for heating or other purposes, and the materials and apparatus or means employed therein.—J. Donald. Mechanical stoking apparatus for steam-boiler and other furnaces.—W. Perkins. Means of and appliances for effecting communication between passengers and guards of railway trains.—L. Dolne. Revolvers.—C. Pieper. Steam-boilers (com.)—W. R. Lake. Permanent way of railways (com.)—C. Stuart. Safety valves for boilers and the means or apparatus for detecting the height of the water in the same.—N. Brown. Weighing machines.—W. H. Bailey. Steam boiler fittings, partly applicable to other purposes.—W. Edwards Manufacture of railway and other wheels.—W. Walkington. Construction of wheel or roller skates.

On February 15th.—542 to 555.—E. Kaulbach. Rotatory engine.—J. W. Shaw. Method of and apparatus for cutting off steam in the cylinders of steam-engines.—A. Clark. Treadle apparatus (com).—C. H. Turner. Apparatus for improving the draught of chimneys and preventing their smoking.—E. Shaw. Wheels for perambulators, velocipedes, and all descriptions of carriages or vehicles.—J. Osmond. Dog-carts and other two-wheeled conveyances.—J. Hesling. Fulling or milling machines.—J. Brown. Machinery or apparatus for the manufacture of confectionery.—G. G. de L. Byron. Springs for railway and other carriages and waggons (com).—H. F. Woodward. Overalls for workmen and others.—I. Evans. Construction and manufacture of handles for rug, shawl, parcel, and other straps, bags, portmanteaus, and for other like articles. C. G. Shone and R. Walker. Apparatus for communicating between passengers and drivers of railway trains.—R. A. Melvill. Apparatus for fastening windows, which apparatus is also applicable for other fastening purposes.—E. M. T. Garnier. Spring fastenings.

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JUNE 1, 1875.

THE ANNUAL GENERAL MEETING OF THE INVENTORS' INSTITUTE.

On 20th of May the Annual General Meeting of the Inventors' Institute was held at 4, St. Martin's-place, Trafalgar-square, when Sir ANTONIO BRADY, President of the Council of the Institute, took the chair, who briefly commented on the important epoch which the Institute had now arrived at, and said that this might well lead those present to treat the meeting as one of exceptional importance. He then called upon Mr. F. W. CAMPIN, the Secretary, to read the Minutes of the last General Meeting (see SCIENTIFIC REVIEW), and these having been read and confirmed as correctly entered, Sir Antonio called for the Report of the Council, which was as follows:—

THE THIRTEENTH ANNUAL REPORT OF THE COUNCIL OF THE INVENTORS' INSTITUTE.

In presenting the thirteenth annual report to the members of the Inventors' Institute, the Council feel deeply impressed by the gravity of the circumstances with which they are surrounded, and scarcely know whether they ought to utter words of congratulation or condolence.

The fact that the Bill introduced by the present Lord Chancellor (Lord Cairns) is now before the House of Commons, and that the measure, if passed into law exactly as it stands, will be one alike injurious to the inventor and dangerous to our industrial progress, are so much matter of notoriety, that the Council deem it unnecessary to enter into the subject more in detail just now, especially as the Journal of the Institute (the SCIENTIFIC REVIEW) for March, April, and May, has published full particulars as to the Bill. The Council, therefore, at once proceed to review the business of the past year from its commencement, in May, 1874.

The same idea that pervaded the minds of the members of the Council in 1873-74 has been as influential in the sessional year now terminating, namely, the arrival of the time when some great change will be made in the Patent Laws, and hence they have considered that the first duty they had to perform was to continue the endeavours that were begun during the former sessional year, to secure the attention of the Government for the proposals which had been made for amending the Patent Laws in accordance with views enunciated by this Institute, and to this end it was considered that it would be well (amongst other means of advancement) to seek the aid of the working classes, for which purpose a Conference between some representatives thereof and of members of Parliament known as taking special interest in their welfare was convened at the Institute, on August 6, 1874, under the presidency of Sir A. Brady, when a general agreement was arrived at that the principles advocated by the Inventors' Institute in regard to the Patent Laws, especially as set forth in the Invention Right Bill prepared by the Institute, would be likely to receive the support of the artizans of this country.

This conference having taken place so close to the time of the Parliamentary vacation, no public action was then taken, but there is no doubt that the operations of the Institute on the subject of the Patent Laws have been helped forward thereby, and it is a noteworthy fact that the working classes are at the present moment taking a very active and prominent part in the proceedings on the Lord Chancellor's new Patent Bill, for not only have they, (at the suggestion of the secretary and other members of the Institute) formed an Artizan and Inventors' Patent Bill Amendment Committee, but many of the Trades Councils have petitioned against it, and are widely agitating, the question.

During the Institute's vacation and that of Parliament little could, of course, be done to advance Patent Law Amendment. This much, however, was undertaken and performed, namely, the appointment of some of the local members of the Institute as its representatives at the British Association meetings at Belfast, and the Social Science Congress at Glasgow, though their services were not prominently called into requisition, as at neither of those gatherings did anything of importance with regard to the subject take place. The Council having in the early part of the year 1874 been in communication with the Government of the day on the subject of Patent Law Amendment, this communication resulted in the Lord Chancellor agreeing to receive a deputation of the Institute on the subject, the reception of which, however, he postponed till the end of the year, and finally arranged to receive such deputation on the 14th of December last. Accordingly, a deputation, consisting of Sir Antonio Brady, President of the Council; Captain Selwyn, Vice-President of the Institute; Mr. Hinde Palmer, Q.C.; Mr. James Howard, late M.P. for Bedford; Mr. F. H. Varley, Vice-President of the Council; Mr. M. M. Harris, treasurer; Mr. Lister, Mr. A. J. Murray, Mr. J. C. Peacock, Mr. C. G. Carttar, Mr. T. Morgan, Mr. T. Paterson, Mr. H. Broadhurst, and a large number of other gentlemen attended on his lordship. The Lord Chancellor attentively considered the views placed before him by the Institute, and as the proceedings at that deputation will be found fully reported in the February number of the Journal of the Institute, it is unnecessary here to do more than state that the points in which the Patent Law required amendment were stated to his lordship to be—cheapness in the cost of obtaining patents; provisions for a searching system of preliminary examination of the invention by a permanent staff of examiners; a large and efficient organisation as a separate department under a high official directly responsible to the representatives of the nation, and having well arranged museums and offices where information on the subject of inventions and patents can be obtained by the public. And his lordship's attention was directed to the American Patent system as in many respects embodying in a practical form the above points, subject, however, to several qualifications as to practical details; also that the *compulsory deposit of models was highly objectionable* as likely to entail considerable and indefinite expenses upon inventors. The memorial referred to will be found published in the Journal of the Institute for January, 1875. It is unnecessary to do more than refer to the fact that the Lord Chancellor did not forget the subject, but prepared a Bill which he presented to the House of Lords, and which is now before the House of Commons. This Bill has been objected to by all practical men who are not favourers of anti-Patent Law theories, for although it provides for an examination system prior to the grant of a patent it is a kind of examination which will leave it to a few officials to exercise a practically irresponsible *veto* upon every application for a patent, so that it will be utterly uncertain when anyone applies for a patent whether he will get it or not. Moreover, the Bill provides for no appreciable reduction of stamp duties, and requires a full specification to be lodged at the very first stage, which will place many inventors in a position of very great difficulty, as they will be unable to quickly protect themselves when resorting to the professional aid of gentlemen capable of advising them in Patent Law matters, or to practical men of the trade affected by their inventions, without doing which they will be unable to make a satisfactory specification. This will also necessitate the payment of the larger portion of the cost of obtaining the grant of patent at the very outset, and before there is any chance of knowing whether the grant will be obtained or not. Thus considerable cost will have to be incurred with the risk of loss which according to the terms of the Bill is very likely to occur. The Institute has paid much attention to the progress of this Bill, and through its secretary communicated with the Lord Chancellor upon the subject; and it may be mentioned that his lordship made a material alteration therein before it left the House of Lords in accordance with the communication made by the secretary. Beyond this the Council have held conferences with the members and others on the subject, and it has been agreed that a public conference of all bodies and parties taking an interest in the matter be held at the Hall of the Society of Arts (which has been kindly lent by the council of that society for the occasion) on Tuesday, the 25th day of May inst., when it is hoped that a large and influential gathering will be obtained, which will prove advantageous for amending this Bill so as to render what is now an objectionable measure worthy of being called an amendment of the Patent Law.

Although the Council has given so much attention to the special business of Patent Law amendment, yet they have not been inattentive to the general interests and the other important objects of the Inventors' Institute.

Many members and friends of the Institute considered that it would tend to strengthen its position if a public dinner took place. The Council, therefore, determined that the opening day of the session should be celebrated by a dinner at St. James's Hall, and accordingly the dinner took place on that occasion. Sir Antonio Brady presided, Major Beaumont, M.P., and many other influential persons being present.

The session thus inaugurated proceeded in a satisfactory manner, the following important papers being read and discussed at the fortnightly meetings, viz., "On a Double Blade Propeller," and "On Engine Room Skylights," by Captain Bingham; "Combustion of Oils for Steam Generation," by W. Gadd, Esq., C.E.; "On Inventions in Sewing Machinery," by Newton Wilson, Esq.; "On Utilising Wave-motion for Propelling Vessels," by R. J. Browne, Esq.; "On New Traversing Crank for Motive Mechanism," by John Hardy, Esq.; "On Shipboard Appliances for Saving Life at Sea," by S. Calley, Esq.

The Council regret they have not been able to present more papers to the notice of the members at these meetings; but the necessity of holding conferences on the subject of the new Patent Bill and Patent Law Amendment generally has prevented their doing so, as on evenings thus occupied no papers could profitably be read. Two of these meetings are, however, worthy of special notice, that for Mr. Newton Wilson's paper, at which a large number of persons attended, and were much gratified by a very complete exposition of models of the various kinds of sewing machines; and that for Mr. Calley's paper, at which Thomas Brassey, Esq., M.P., presided, who delivered an important address.

The Council recommends that the thanks of the Institute be given to the readers of all the papers above named, and to the inventors of the improvements referred to in such papers.

The question of amending the rules of the Institute, which was brought under the notice of the members at the last annual general meeting has again been brought under the notice of the Council, the following report from the Sub-Committee appointed to consider them having been received.

The Sub-Committee appointed by resolution of the Council of the Inventors' Institute on 16th March, 1874, to consider and report (if any) what improvement can be made in the rules of the Institute, report that it is desirable to so alter these rules that in future they should stand as follow :—

No. 1. To remain unaltered.

No. 2. The same.

No. 3. The Institute shall be under the management of an *Executive* Council, consisting of the President, Vice-Presidents, and twelve other persons elected from and by the members, *one-third to retire annually by rotation but to be eligible for re-election.*

No. 4. The Executive Council shall meet at least once a month, and five members, including the Secretary, shall form a quorum. Notice of each meeting shall be given by the Secretary by post at least 7 days previous to such intended meeting.

No. 5.—Regular minutes of the proceedings of the Executive Council shall be kept, and a fair copy of those of the preceding one shall be submitted for confirmation at each meeting.

No. 6.—This rule to be altered as follows :—The word "*Executive*" to be added before Council, "*to remove*" to be substituted for "*expel,*" and "*removal*" for "*expelled.*"

No. 7. This rule to be thus altered :—"*Executive*" to be added before Council, and "*to*" after submitted (line last but one).

No. 8.—"Executive" to be added before the word "Council."

No. 9.—The General Council to be elected annually at the general meeting will consist as heretofore (the case with THE Council) of the president and vice-presidents, *ex-officio*, and such other persons as having been proposed by the Executive Council, shall be elected by the members in general meeting. The General Council shall be summoned on such occasions (not less than once a year) as the Executive Council shall think necessary. Such meeting to be held, when possible, immediately previous to the Annual General Meeting.

No. 10.—Word "*Executive*" before "*Council.*"

No. 11.—The same.

No. 12, 13, 14.—New rules (see printed copy in another column).

With regard to these alterations it is here proper to remind the members of the Institute that at the last annual general meeting a course of action was adopted, intended to have much the same practical effect as is desired to be accomplished by these alterations, namely, the initiation of an Executive Committee of Council of twelve members, and this has been working ever since, and the publication of minutes and notices in the Journal of the Inventors' Institute was authorised. Also that during the vacancy of the office of the President of the Institute the Chairman of the Council be deemed the President, and that such chairman be styled President of the Council, and that two Vice-Presidents of the Council be appointed—one for general meetings of Council, and the other for executive meetings. Further, that the secretary and auditor remain on the same footing as heretofore.

Leaving these rules to be dealt with by the members, the Council have only to remark that the audit of accounts of the Institute has been very carefully conducted, and they are happy to say that although the state of the finances show them to be in a very tolerable condition yet, looking at the number of very important matters that the Institute has to deal with, it is very desirable that the members should give to it as much pecuniary support as they can; hence they would again appeal to all members not to allow their subscriptions to remain in arrear.

The Chairman moved and Mr. Regan seconded the reception and adoption of the report, which was carried umanimously.

The Chairman called on the Hon. Auditor, Mr. C. G. Carttar, to produce the balance-sheet, which being put in was read by the secretary, and passed unanimously.

The proposed new rules were then read and being amended in regard to rules 13 and 14, and after some necessary verbal corrections made, passed unanimously, the Chairman moving and Mr. Campin seconding the passing thereof.

The question of electing the officers was then considered, when Mr. Carttar moved and Mr. Murray seconded, and it was carried unanimously, that it be referred to the Executive Council to select a president of the Institute.

Sir Antonio Brady was reappointed President of Council, and F. H. Varley, Esq., Vice-President of Council.

And as Vice-Presidents of the Institute—The Right Hon. the Earl of Caithness, the Hon. Algernon Egerton, M.P., Sir Thomas Fairbairn, Bart., A. B. Beresford Hope, Esq., M.P., His Grace the Duke of Manchester, Robert Richardson, Esq., C.E., Captain Jasper Selwyn, R.N., Sir Fothergill Cooke, Cromwell F. Varley, Esq., F.R.S., &c. As General Council (including the above-named) :—Alexander Allan, Esq., C.E., P. W. Barlow, Esq., C.E., F.R.S., W. H. Barlow, Esq., C.E., F.R.S., Henry Bessemer, Esq., M.P., W. Boulton, Esq., Benjamin Burleigh, Esq., C.E., S. Calley, Esq., F. W. Campin, Esq., C. G. Carttar, Esq., D. K. Clarke, Esq., C.E., Dr. Robert H. Collyer, F.C.S., Samuel Courtauld, Esq., H. C. Coulthard, Esq., C.E., Dr. J. M. Croft, Robert Davidson, Esq., C.E., William Dempsey, Esq., C.E., John Farmer, Esq., J. Faulding, Esq., C.E., H. A. Fletcher, Esq., C.E., F.R.A.S., Conrad Finzel, Esq., M. M. Harris, Esq., G. W. Hemans, Esq., C.E., W. T. Henley, Esq., Alexander Mitchell Innes, Esq., W. Mitchell Innes, Esq., Julius Jeffreys, Esq., F.R.S., Dr. H. C. Jennings, Dr. P. W. Latham, M.A., Edward Lord, Esq., D. J. McLauchlan, Esq., Walter Macfarlane, Esq., Colin Mather, Esq., John Mackintosh, Esq., W. W. Moore, Esq., Thomas Morgan, Esq., George Frederick Muntz, Esq., A. J. Murray, Esq., C.E., A. Normandy, Esq , J. J. Parkes, Esq., C.E., W. H. Preece, Esq., C.E., T. W. Rammell, Esq., John Ramsbottom, Esq., C.E., Fred Ransome, Esq., C.E., John Saxby, Esq., A. Sedley, Esq., C. Williams Siemens, Esq., C.E., F.R.S., E. Sonstadt, Esq., Berger Spence, Esq., Robert Wheble, Esq., Hume Williams, Esq., E. O. W. Whitehouse, Esq., C.E., W. N. Wilson, Esq.

The Hon. Treasurer (M. M. Harris, Esq.), Hon. Auditor (C. Graham Carttar, Esq.), and the Secretary (F. W. Campin, Esq.), were reappointed. The Executive Council, being twelve names selected from the above, were then elected. We give the list elsewhere. Votes of thanks to the readers of papers, to the officers, and to the Council were passed and responded to, and the meeting terminated.

Mr. Stanford's patent for manufacturing certain chemicals from seaweed having expired, an application for renewal was made to the Judicial Committee of the Privy Council on May 4, but refused. Their Lordships considered that £4,800 in shares, which it was shown had been paid to Mr. Stanford for the right of working his invention by the British Seaweed Company, was a sufficient remuneration. This decision, which has occasioned some surprise, indicates how strong is the tendency on the part of the Privy Council against extension of patents;—shown also by the Lord Chancellor's Bill. Practically, in this particular case no great injury is effected, because to compete with the present workers of the process would demand large capital and special acquirements. But the theory is suggestive. If £4,800 is sufficient reward for an idea which has required fourteen years of hard work to develop, and which, according to the testimony of the Duke of Argyll, has largely benefited one of the poorest sections of the empire, how much ought an untried patent to be worth?—*Chemist and Druggist.*

Reviews.

HOUSE WARMING.

"Our Dwellings Warmed as They Are and as They Might Be; with a Chapter on Ventilation." By J. W. C. London: Lockwood and Co., 7, Stationers' Hall-court, Ludgate-hill. 1875.

THIS is a small book on a great subject, and it is quite worth while for anyone to read it, for he may profit thereby; since the principal point in it is one that, although often repeated, has never yet received that practical attention its importance demands, namely, the fact that our ordinary domestic fire-places and open stoves are wasteful and inefficient to the last degree.

We cannot, however, agree with the author in his unreserved commendation of slow-combustion or close stoves, which are, after all that can be said in their favour (if made of iron or metal), neither healthful nor cheerful; and this latter matter is worth consideration in our climate, which so often affords us the benefit of cloudy, cold, damp, dispiriting weather. Nor can we agree with the author's wholesale condemnation of gas stoves; for, when properly constructed on a good plan, there is no reason why they should be any more objectionable than the close stoves our author praises so much.

On the hot-water system the author gets on to less undebatable ground, and we quite agree with him that with the hot-water system, ventilation can be brought to much greater perfection than on the old open-grate system, though we do not think that many of us will care for having our sitting-rooms warmed by hot-water pipes, for the reasons we have before stated, and we live in hope that inventors will arise who, by a combination and system, will present us with the advantages of all the different systems of heating and ventilation, without their defects.

AIR AS FUEL.

"Air as Fuel; or, Petroleum and Other Mineral Oils Utilized by Carburetting Air and Rendering it Inflammable." By OWEN C. D. ROSS, M. Inst. C.E. Second edition. London: E. and F. N. Spon, 48, Charing Cross. New York: 446, Broome-street. 1875.

THIS work, although now issued as a second edition, has been such a little time before the public, that we expect it will be found to be a novelty to most of our readers; and it is not too much to say that it compresses into the small compass of seventy-six pages a comprehensive treatise on the subject of fuel, especially liquid fuel.

We have no wish to obtain the reputation of alarmists, but we do firmly hold to the opinion that our coal-fields are rapidly exhausting; and looking at the progress of our population, it is difficult to say exactly when the end of our coal supply may be arrived at. This much, however, is certain, that long before that time arrives, if we continue as we at present do, to rely mediately or immediately almost wholly upon coal for our fuel, its cost will be at "famine" rates very speedily. We think, therefore, everything should be done to bring other fuels into competition with coal as much as possible, and that Mr. Ross seeks to point out how this can be effected will appear from the preface to this second edition of his little work, where he says it is estimated (See "Mineral Statistics for the year 1873," by Robert Hunt. F.R.S., &c., &c.) that in the year 1873 no less that 6,560,000 tons of coal were used in gas manufacture, the analysis of the gas supplied by the Chartered Gas Company showing that the quantity of carbon — the light-giving material in gas—extracted from that quantity of coal was only about 292,000 tons.

Now that quantity of carbon is contained in less than 410,000 tons of mineral oil, which can be wholly vaporized and used for carburetting air, and it follows that 410,000 tons of oil would more than suffice for the manufacture of an equal volume of gas, of equal luminosity, to that obtained from 6,560,000 tons of coal. Here then there is evidently a large field in which to obtain economy in the consumption of coal.

It would be easy also to demonstrate that if ever mineral oils or petroleum should be generally applied to metallurgical purposes, an enormous reduction might be made on the 35,000,000 tons of coal used in 1873 in iron manufacture; more than half of that quantity having been required for the conversion, at very high temperatures, of pig-iron into par or merchant iron, &c. Again 20,000,000 tons were used for "Domestic Consumption," and 3,650,000 for "Steam Navigation," both of which figures might be very much reduced by even the partial substitution of carburetted air for coal.

The way in which the author expects to accomplish such a reduction is by a system of carburetting, which he nominates "Burning Air," as to which he says: Although it is customary to regard the act of combustion as one in which the principal fuel burnt is that which we have perceptibly before our eyes in the form of coals, wood, peat, or charcoal, &c., the truth is that combustion is maintained by comparatively small quantities of carbon and hydrogen derived from the visible fuel. These are combined with a far larger quantity of diluted oxygen supplied to the fire by the air or draught, which, only because it is in a form invisible to our eyes and apparently costs nothing, is often too little considered when treating questions connected with the economy of fuel; and I venture to hazard the suggestion, that if we were accustomed to speak of the process of combustion as one in which air is the principal and carbon or hydrogen only the auxiliary element—if we were to say that we burn air instead of saying that we burn wood or coal—it would not only be equally accurate, but such a definition would be found to lead to a clearer and more easy comprehension of the conditions under which heat can be most advantageously obtained, It would then be manifest that this must depend almost entirely on the answer to the questions of *how air can be most economically carburetted*. Taking this view of combustion, and commencing by the consideration of the elements of which fuel is composed, we shall see that the harder a fuel is, the greater is the quantity of heat expended in overcoming the attraction of the particles of carbon for each other; and it has been shown by Professor M. Rankine that whereas carbon in the form of diamond would give far less heat than coal, on the other hand, if we could get pure carbon from any natural source in the gaseous state, we should be able to save the heat employed in transforming it from the solid to the gaseous state, and utilize that additional heat. Mr. Rankine has proved that by this means nearly 50 per cent. additional evaporative power should be obtained from the combustion of carbon.

All mineral oils are comparatively speaking pure hydrocarbons, free from sulphur, and also from the ordinary impurities which occasion ash when coal, peat, or wood is burnt, and generally devoid also of the oxygen which forms a part of the composition of all solid fuel and diminishes its calorific power. They are susceptible of being as completely converted into vapour as water itself; and although it is generally believed by chemists that carbon has never been and cannot be separately vaporized, the process about to be described furnishes the nearest approach to it, for it consists in gradually converting the oil into a thin vapour of mixed carbon and hydrogen, and therewith impregnating atmospheric air so that it shall enter the furnace already sufficiently combined with gaseous carbon and hydrogen to be immediately and by itself inflammable.

Now it is not by any means necessary to heat the oil to the point of ebullition in order to obtain such a vapour as is required, but on the contrary a very slight degree of heat is sufficient. Indeed, when heated to the temperature of ebullition, the vapour is too dense for economical use as fuel, and inevitably occasions smoke, which circumstance may easily account for the failure in the trials at Woolwich previously recorded. Even coal gas is much too highly carburetted to be available in its ordinary condition for heating purposes, and it is a fact with which we are all familiar, that when so used, the addition of a Bunsen burner is required in order to increase the supply of air previous to combustion, and so to prevent a considerable loss of its calorific power arising from unconsumed carbon.

In order then properly to carburet air for use as fuel, a very thin vapour, the density of which should not exceed from 4 to 5 per cent. of its full density at the boiling point of the liquid, is all that is required, and this can be obtained by passing a current of air over the surface of the oil, more or less rapidly, and over more or less extent of surface. The air, when it is thus mechanically mixed with the right proportion of vapour so taken up, will burn with a blue flame of intense heat, similar in appearance to the flame of a blow-pipe. The lightest portions of petroleum will, even at temperatures far below the freezing point of water, supply, if confined in a closed vessel, more than sufficient vapour to carburet the air and render it inflammable. The heavier portions of the oil will require a higher temperature in order to produce the same result, so that some oils with high boiling points must be slightly heated artificially in order that they may give off a sufficiency of vapour to mix with the air.

The quantity of vapour obtainable at different temperatures is subject to known laws and can be calculated with tolerable accuracy, and it is important, by means of an example, to illustrate how this may be done.

In accordance with a law first enunciated by Dalton, the tension of the vapours of all liquids is the same at temperatures equally removed from their respective boiling points, and although this is not invariably correct, it is sufficiently so for our present purpose.

Now the boiling point of the lightest petroleum spirit which is practically applicable to the carburetting of air is 126° Fahr., and the tension at 32° Fahr. of the vapour of this spirit must therefore be approximately equal to the tension of water vapour at 94° below 212° Fahr., that is to say, 118° Fahr., which, by reference to the published tables of the tension of water vapour, may be seen to be 3·241 inches. Comparing this with 29·92 inches, which is the tension of both water vapour and of the petroleum vapour at their respective boiling points, it will be seen that it represents 3·241-29·920, or 10·83 per cent., and this proportionate quantity of the vapour which would be obtained from the liquid on ebullition, the specific gravity of which has been ascertained by experiment to be 2·85 (air being 1·00), is the maximum quantity of vapour which will be evaporated and may be absorbed by a given volume of air at the temperature of 32° Fahr. The specific gravity of the vapour at this temperature being $2{\cdot}85 \times 0{\cdot}1083 = 0{\cdot}30865$ by comparison with air, it follows that, as 1 lb. of spirit would at the same temperature be 40·14 cubic feet, and following the laws which regulate the diffusion of gases, would occupy precisely the same space when absorbed by air as if it were in a vacuum, so that it would enter into and fully saturate 40·14 cubic feet of dry air.

The vapour from 1 gallon or 6·55 lbs. of this spirit would therefore saturate $40{\cdot}14 \times 6{\cdot}55 = 262{\cdot}92$ cubic feet of air, and 1 ton of the same quality of petroleum is capable of saturating 89,914 cubic feet of dry air at 32° Fahr.

It is not, however, necessary or even advisable when using the spirit as fuel to saturate the air with the maximum amount of vapour that it could contain, but on the contrary, to limit the quantity to no more than is necessary in order to obtain a gas which shall burn without any deposition of carbon, and with this view we will proceed to show that more than 700 cubic feet of air may be carburetted with the vapour of one gallon of the spirit which has been selected for this illustration.

The specific gravity of this is 0·655 as compared with water and its composition $C^{11} H^{26}$, that is to say, 1 ton of the spirit contains 1,607 lbs. of carbon and 633 lbs. of hydrogen.

If it be desired so to carburet the air as to obtain a pale blue flame and to mix 6 parts by weight of carbon with 9 parts of oxygen, mixing the hydrogen at the same time with half the quantity of oxygen which it would require for complete combustion, then the 1,607 lbs. of carbon would require to be mixed with 2142·666 lbs. of oxygen, or 9,642 lbs. of atmospheric air; and the 633 lbs. of hydrogen would require 2,532 lbs. of oxygen, or 11,394 lbs. of air. One ton of the spirit may thus be made to combine with 21,036 lbs., or 260,636 cubic feet of air, and will produce that quantity of an inflammable gas; or one gallon weighing 6·55 lbs. will produce 762 cubic feet. This is more than twenty-six times the quantity of gas obtainable from one ton of coal.

When heavier oils are used with higher boiling points, the degree to which the temperature of the oil must be raised will be in proportion to the difference in their temperature of ebullition. For example, an oil which boils at 212° Fahr. will give off at 118° Fahr. the same quantity of vapour that is obtained at 32° Fahr. from the spirit we have just been examining, the boiling point of which is 126° Fahr.

Mr. Ross goes on to speak of the practical applications of carburetted air, as to which he states:—

In the United States there are said to be now fourteen cities and towns lighted with gas made exclusively from petroleum spirit, or naphtha, as it is there called, and many others where it is used in combination with coal gas. Its advocates assert that its quality is in all respects far superior to coal gas, and in many foreign countries where coal is dear, as well as in India and Australia, carburetted air might well be substituted for coal gas for town lighting.

With regard to its application as fuel for steamships, it should be remembered that when the Government, at the instigation of Capt. Jasper Selwyn, who may well be regarded as the original pioneer of "liquid fuel," undertook the experiments at Woolwich, with the object of testing the value of mineral oils as fuel for the navy, the impression was that, if adopted, the oil would have to be stored in large tanks, and that the mode of burning it would involve nothing less than a "reconstruction of the navy." But my plan involves nothing of the kind. No material alteration in the boiler furnaces would be necessary, and all the circumstances upon which to base an opinion as to the relative advantages of such fuel have radically changed since the very great fall which has occurred in the price of petroleum and the discovery of this method of utilizing it.

The oil would be stored on board ship much in the same way in which it is sometimes stored in the ships which bring it from the United States. Upwards of a million tons of petroleum are now annually brought to Europe, and yet, as far as I have been able to ascertain, no accident by fire has ever occurred to any ship so laden. This is a practical proof that with due care no danger need be apprehended.

It is a peculiarity of the system that, even on board ship, the oil would never require to be brought within 50 or 100 feet of the furnace fires, and never be poured out from the metal cases in which it would be brought on board and stored during the voyage.

These cases would be placed on a series of shelves, surrounding one, two, or three sets of carburettors, each case having its corresponding niche on the shelf, upon which it would perhaps from time to time be shifted, but from which it would never be removed until the end of the voyage, when the empty cases would be discharged and replaced by others that were full.

The storehouse should be placed at a distance from the boiler furnaces, and would occupy about one-third of the space now occupied by coal, which, on board of a Liverpool and New York steamer, carrying 1,000 tons of coal, is about 40,000 cubic feet. The 13,000 cubic feet might be distributed thus: 50 feet long by 20 feet broad and 13 feet deep, but the exact shape given to the storehouse would be immaterial. Careful provision should be made for the escape of vapour to the sea, supposing that any was, through negligence, allowed to issue from the cases.

At the foot of the shelves would be placed a number of shallow carburettors, one above the other, in a frame formed of hollow struts and coils, which would be heated, when necessary, by steam to sustain and vivify the vaporization of the oil.

If constructed 10 feet in diameter and 4 inches deep, engines of 300 H.P. (nominal) would require a column 8 feet in height of such carburettors; engines of 600 H.P. would require two such columns, and engines of 900 H.P. three such columns.

Each metal case of oil should have an outlet tap, and be connected with a carburettor by means of flexible pipes successively shifted from one case to another; these pipes would lead from the taps on the cases above to the carburettors below, not actually entering the latter, but screwing (by means of union screws) on to corresponding tubes which would be permanently fixed to the sides of the carburettors, and bent down inside as far as the surface of the oil. On the taps at each end of the flexible pipe being then opened, the oil would descend through it only just as fast as oil was vaporized and consumed in the carburettor; for, on the level of the oil being lowered, the end of the tube would be uncovered by the liquid and air would ascend to the cases above containing the supply, and displace an equivalent quantity of oil, which would then flow down to the carburettor. Transparent gauges would enable an attendant to observe and prevent any excess of oil descending by merely turning the taps on or off.

Thus, under ordinary circumstances, there could never be any escape of vapour in the storehouse; whilst even should such an escape accidentally occur—and again, even if the escaping vapour or gas were incautiously set fire to—it would not matter, for the fire could neither penetrate the metal cases of oil nor the metal carburettors, and it could not therefore continue or extend.

The air having been drawn through the carburettors to the fans, would from thence again be propelled forward to the boiler furnaces, through well-protected gaspipes, terminating in fire-proof twyers at the ends where the stream of gas entering the furnace would be ignited.

The joints of the gaspipes, after being made as tight as possible, should be covered with elastic india-rubber cloth or tubing.

Such being the arrangement, no danger could arise, for even if any one of the fans got out of order, there would simply be a cessation of the current of air, and consequently a cessation of gas as far as that particular fan and the pipes connected with it were concerned, and the fire in the furnace from that one fan would be extinguished.

ON SYSTEMS OF CONSTANT AND INTERMITTENT WATER SUPPLY, AND PREVENTION OF WASTE.

BY MR. G. F. DEACON, M. INST. C.E.

THE following is the substance of a paper on the above subject read at the twenty first ordinary meeting, 1874-75, of the Institution of Civil Engineers, and had also special reference to the restoration of constant supply in Liverpool:—

After explaining the general sources of waste, and the effect of intermittent service on the supply, and entering fully into the objections on sanitary grounds to intermittent service and waste of water, the author described the parliamentary powers, in reference to pipes and fittings, which until recently had been found necessary, before any corporation or company could give a constant service of water with no greater consumption per head than under the intermittent system. The Acts of Parliament in question had in effect empowered the authorities to prescribe the nature in detail of all fittings and pipes which in their judgment might tend to waste. The Liverpool Corporation had no such powers, and they had never been enabled to order the alteration or removal of any fitting or pipe, however defective, until seen by the inspector to be actually causing waste of water.

The author proceeded to state that ordinary house to house inspections had been regularly made from the year 1863 to 1873. In cases of actual waste arising from defects, notices to repair were served upon the persons responsible for the water rates, and such other steps were taken as the legal powers rendered available. He showed by a statistical table that though the waste-water inspectors had no doubt produced useful results, there was nothing to indicate that, by increasing their number, much further saving would be effected. Indeed, experience was adverse to the possibility of success in the endeavour to reduce the consumption materially even while maintaining intermittent service; and the idea of restoring constant service, with the existing parliamentary powers, was generally regarded as chimerical.

It was under these circumstances that the Corporation authorised the making of a series of experiments, with a view to discover the locality of a larger proportion of the waste than the house-to-house inspectors were enabled to trace. In carrying out those investigations, the mains supplying fourteen districts in the most densely populated part of the town, containing, in the aggregate, about 31,080 persons, were provided with ordinary piston meters.

The experiments conducted in these districts were then explained in detail. The house service-pipes had been provided with stopcocks under the footway, and the inspectors, by applying the turning-key to the stopcocks during the night, and placing the ear upon it, were enabled to ascertain in which of the house service-pipes or fittings water was passing to waste. The results were eminently satisfactory, for the consumption of water which under nine hours' service had been 19·5 gallons, and under constant service 33·5 gallons per head per day, was reduced under constant service to 13·3 gallons, and subsequently to about 12 gallons; while in one district of 2,134 persons it was brought down to 6·6 gallons, without altering a single fitting which had not been found to be actually wasting water.

But in order to obtain such results over the whole district of supply, including a population of 630,000, in a sufficiently short time to ward off the expected dearth of water and to restore constant service, it would have been necessary to inspect several districts every night; and it would have been impossible to ascertain how far the closing of the stopcocks commanding wasteful property had been faithfully performed, as no record was preserved of the change in the rate of movement of the piston-meter, except that returned by the inspectors themselves. The cost, too, of reliable piston-meters and of the necessary chambers, was very great, while the expense of maintenance was considerable.

The author then devised an automatic check upon the motions, at once of the night inspectors and of the water, the cost of which was comparatively small. The instrument, known as the "Waste-water Meter," recorded the two elements of time and rate of flow through the main, after the manner in which an indicator diagram recorded space and pressure. Thus not only was the change of velocity, induced by the closing of any stopcock during the night, registered, but the time at which the men commenced their work, and the time at which they ceased to work, was recorded with fidelity.

In the establishment of waste-water districts, the existing arrangement of services for distribution was, as far as possible, adopted. The number of meter districts on the 10th April, 1875, was 120, and the population under control, 306,912. A district having been selected, a sketch was prepared showing the place the meter was to occupy. A length of pipe was removed from the outlet-side of the service valve, and connecting pipes were laid to beneath the nearest point of the footway, and conveyed the water through the meter. The cast-iron meter covered was placed in the footway next to the kerb. After a meter had been fixed, readings were taken to ascertain the consumption of water in the district under the ordinary intermittent supply. The district was next placed under constant service, and the consumption ascertained under that system, before measures for the prevention of waste were commenced. Stopcocks were attached to the lead-service pipes of all premises, or blocks of premises, which were not already capable of being controlled from the exterior. All new stoptaps were on the screw-down principle, and the loose valve was so arranged that it could not fall out when the stuffing-box was removed. The surface cover was fixed into the upper side of the flag with Portland cement. The hinged lid was round, and large enough for a man to pass his arm down. Though all new pipes were laid 2 feet 6 inches deep, they were brought up at the stopcocks to within arm's length, that a washer might be placed without opening the ground.

The method of night inspection was then described. The stopcock covers were raised, and the stopcocks subjected, one by one, to a test to ascertain if water was passing into the premises. If, on applying the key to the stopcock plug and the ear to the key, no sound was heard, the stopcock was turned until nearly closed; and if water were passing, it would then, by reason of its increased velocity, make a sufficient sound to be heard. In this manner the flow due to a quick dropping could easily be detected. If noise was heard with the tap open, the tap was at once completely closed, and tested again, when, if the sound continued, there was evidence of waste on the street side of the stopcock. Where leakages arose from defective private pipes or fittings, notices to repair were issued, unless a new washer or an adjusted wire would do all that was required. In such cases the inspector performed the work free of charge. Defective public pipes were reported, and repaired by the Corporation pipe-layers. By the aid of the diagram from each district the superintendent determined the time, within a few minutes, when the inspectors commenced their work and left the district in each case, the localities of all, and the amounts of the more important leaks which had been checked, the initial night consumption and the final amount to which the closing of a limited number of stoptaps had reduced that consumption. The diagram obtained after a night inspection showed the lowest consumption reached by the closing of those stopcocks past which a flow of water had been detected. If a margin remained, which could not be accounted for, a special day experiment was made by the chief inspector to determine the condition of the public pipes. All the stopcocks having been closed, the diagram was examined. If a steady line was being drawn, it was a proof of steady waste. If the horizontal line was broken here and there by a vertical line, similar to that produced by opening a tap, either all the stopcocks had not been closed, or some house services were not provided with stoptaps. In old districts some omissions were, in the first instance, almost sure to be made; but with the help of the meter, every service was ultimately controlled. When the existence of "public waste" had thus been determined, it could generally be localised by a careful night inspection with all the stopcocks closed. If this was not successful, the sewers were entered, and the position noted of any undue flow down a drain, or weeping through the brickwork.

It was stated that the experiments in the fourteen districts commanded by piston-meters were commenced in January, 1873; but it was not until October in the same year that the first waste-water meters were fixed. In its earlier stages the system progressed slowly, but recently it had gained in speed. For some time past twelve meters, controlling about 25,300 persons, had been fixed each month; and it was found that, with one chief inspector, twelve ordinary inspectors, six labourers, and one waste-water meter inspector, and two inspectors to attend to special reports in other districts, it was easy to restore constant service to 5,000 persons per week, to sustain it in the old meter districts, and to maintain the average consumption over the whole area supplied at a constantly diminishing rate.

In March, 1874, about 170,996 persons, and in March, 1875, 373,500 persons in the borough were receiving constant supply. During 1873 the maximum number of hours' service to the intermittent districts in the borough was 10½; the minimum, 7½; and the average, 10. Since then the average had been maintained at 10½ hours. In 1873 the out township supply to 91,835 persons was reduced for an average of fourteen weeks to 12 hours per day. Since 1874 constant service had been maintained in the out townships throughout the year. At the beginning of 1874 the total population supplied was about 621,000. at the beginning of 1875 it had increased to about 632,000. During 1873 the amount of water taken for all purposes except manufacturers' supplies, measured by meter, was 5,437 million gallons, or 24·42 gallons per head per day. During 1874 the corresponding quantity, measured by meter, was 5,487 million gallons, or 23·8 gallons per head per day. In March, 1874, the rate of supply was about 24·21 gallons per head per day. In March, 1875, it was about 22·26 gallons per head per day.

The number of persons to whose service the waste-water meter system had been applied in Liverpool was 334,000. Taking that moiety of the districts to which attention had been chiefly given, the supply to 117,425 persons, which, under constant service, averaged 32·12 gallons, had been reduced to 15·97 gallons per head per day. If the whole population under treatment was considered, the rate per head per day to 234,000 persons had been reduced from 28·89 gallons to 16·47 gallons, which was equivalent to a total saving of 1,060,792,200 gallons per annum; and the saving thus far would have been 12·42 gallons per head per day. In Liverpool, the term "domestic consumption" had a much wider signification than in most other towns. It included all supplies for sanitary purposes, and a large proportion for business purposes, excepting only those to the larger manufactories, which were measured by meter. In other towns it was usual to confine the term to the use of water in private dwellings; and this difference would be equivalent, in most cases, to several gallons per head per day.

The system described had been tried in every class of property; and in some districts containing the best houses the saving of water had been quite as great as in any others. The policy of the present practice differed chiefly from that of the old in four particulars:—

1. By never employing inspectors in any but those districts in which the meter diagrams showed that the best results were likely to be obtained.
2. By never employing inspectors to examine any premises in which it had not been previously ascertained that waste was taking place.
3. By the detection of the more important, because the more continuous, sources of waste which were rarely discovered by house-to-house visitations.
4. By never renewing old mains except when the meter diagrams had shown that they were actually causing waste to an extent which justified the expenditure.

The work of fixing stopcocks had been commenced before the meter system was introduced. The cost of providing and fixing new ones outside the houses, including the surface cover, reflagging, renewing defective flags, and searching for the service pipe, was about 12s. each. The cost per thousand persons in a town in which stopcocks were already laid would average for the meter and fixing £14 7s. If, however, as at Liverpool, the greater proportion of the stopcocks had to be charged to the system, the cost, including the meter, would be about £39 7s. per thousand persons.

It was concluded that when constant service had been everywhere restored, the staff required to maintain or even to diminish the comparatively low consumption would be considerably less than at present. From experience gained in the districts already under control, there was reason to believe that, in order to keep a proper record of the condition of the whole of the town, it would then only be necessary to take on the average one meter diagram for three or four days per month from each district. The total number of districts would be about 250, and the number of diagrams per day, including those from districts under examination would probably not exceed 20. Each day two or three districts of maximum waste would be provided with new diagrams, subjected to night examinations, and when brought below the average consumption, replaced on the ordinary list.

There could be no doubt that in low-class districts of the Metropolis the waste of water was, on the average, much greater than in Liverpool; but if constant service were restored to any single district, that very fact would in a great measure create its own cure. Many of the outlets for water, which, under a few hours' supply, were left continuously open, would, under constant supply, become such intolerable nuisances that the flow must inevitably be checked; and if the owners of property became aware that all cases of waste would be discovered by the night inspectors, and be watched by the authorities until the cause was removed, in the manner which they might prescribe, the district would soon show a lower consumption than under the intermittent system.

PROGRESS OF CHEMISTRY.

Madder.—Some researches on the relations existing between the different colouring-principles of madder have been carried out by M. Rosenstiehl, who has communicated his results to the last number of the *Annales de Chimie et de Physique.* It is generally believed that four distinct principles are present in madder — alizarin, purpurin, pseudopurpurin, and hydrated purpurin; but the part which each plays in producing the colour is by no means well ascertained. Rosenstiehl's researches tend to show that pseudopurpurin, although itself playing on direct part in dyeing, readily gives rise to the formation of purpurin and hydrated purpurin, and is probably to be regarded as the source whence these bodies are derived. Admitting this, therefore, the number of distinct colouring-principles in madder must now be reduced to two—namely, alizarin and pseudopurpurin.

Alizarin.—According to the *Bulletin de Mulhouse*, M. de Lalande has succeeded in artificially forming purpurin by the oxidation of alizarin. A mixture of concentrated sulphuric acid and artificial alizarin, with arsenic acid, or other oxidizing agent, is heated to 150° or 160° C., and the product thrown into a large volume of water; the precipitate, when well washed, is dissolved in a solution of alum, and on addition of an acid the purpurin separates in dense flocks.

Thallium in Carnallite. — In Liebig's *Annalen*, Dr. Hummerbacher announces that he has detected the presence of thallium in the mineral called carnallite. This is a chloride of magnesium and potassium, which occurs among the *Abraumsalze* overlying the rock-salt of Stassfurt in Prussian Saxony. The red carnallite, when properly treated, exhibited in the spectroscope traces of thallium, rubidium, and cæsium; but it was not found possible to isolate the thallium. Sylvine, or native chloride of potassium, from the same deposits, showed the presence of rubidium and cæsium, but not of thallium; whilst the other potassium-salts, polyhalite and kainite, appear to contain none of these metals.

Phosphates in Rocks.—In a paper recently communicated to the Geological Society, Mr. Hicks calls attention to the occurrence of phosphates in rocks as old as the Cambrian period. He finds some of the beds contain nearly 10 per cent. of phosphate of lime, which he believes to have been derived from the marine organisms whose remains are found fossilized in these deposits. It is notably to the Crustacea, represented by the large Cambrian trilobites, that he refers the origin of these phosphates; in fact the remains of trilobites were found to contain as much as 40 or 50 per cent. of phosphate of lime. With the view of comparing this with the percentage of phosphate in living crustaceans, Mr. W. Hudleston has examined the recent lobster. In the exo-skeleton of the lobster, dried at 100° C., he found 3·26 per cent. of phosphoric anhydride; and in the boiled undried lobster, including both soft parts and shell, he detected 0·76 per cent.; whence he estimates that a ton of boiled lobsters would contain about 17 lb. of phosphoric anhydride.

A good deal of discussion has recently taken place among geologists as to the origin of phosphates in sedimentary rocks. Although in many cases it is clear that the phosphates are obtained directly from organic sources, this is by no means a sufficient explanation of their ultimate origin, since it is clear that the earliest organisms must have obtained their supply from inorganic sources. In fact, it appears that the most probable source is to be found in rocks of igneous origin. Most lavas, and other rocks which are undoubtedly eruptive, contain phosphate of lime in the form of apatite although the proportion of this mineral is generally but small. The wide distribution of phosphates in eruptive rocks was shown many years ago by Prof. Fownes, and his conclusions have been abundantly corroborated by subsequent researches. By the disintegration of such rocks these phosphates pass into the soil, whence they are taken up by plants, and ultimately pass into the animal economy. On the decay of the animal matter they are returned to the inorganic world, and the cycle of changes is thus completed. — Abridged from the *Athenæum.*

AN HOUR WITH THE SEWING MACHINE AND A PAGE FROM ITS HISTORY.

THE meeting of the Inventors' Institute on 25th Feb. ult. was devoted to the subject of Inventions in Sewing Machines, the paper being read by Newton Wilson, Esq.

The chair was taken by Dr. Collyer, Member of Council of the Institute, who said, that the art of sewing seemed to date back even to pre-historic times, for there was abundant evidence to show that needles of bone, and thread composed of animal ligature have been in use in the remotest ages of the world's existence, and yet it was not till some six thousand years after the commencement of the present era that any real advance had been made to improve upon the rude efforts of our earliest forefathers.

Mr. Wilson, in commencing his address, said it appeared to him that Eve put the eye of her needle at the wrong end, and there it had remained nearly ever since—it was set too far back—and it had taken all these thousands of years in coming to the point. The first attempt was made in 1755, when by Weisenthal's patent the eye reached a sort of half-way house, and was placed exactly in the middle of the needle, the needle being pointed at both ends—this patent was for a needle for hand embroidery. The first machine for embroidery was invented in 1804 by John Duncan, who was a Glasgow manufacturer. He invented the barbed needle, which is used to this day for sewing purposes in connection with waxed thread for heavy leather work, and in 1830 a Frenchman named Thimonnier invented a machine for working with hooked needles for the purposes of producing the tambour-stitch then used for the work of embroidering gloves. One of the most important requirements in a machine to supersede hand sewing was an appliance that should perform the functions, first, of the thumb and finger of the left hand in manual sewing—namely, the holding together the two thicknesses of fabric to be stitched during the time the needle was passed through them, and, secondly, of the elbow and right arm which draw the cotton up tightly through the cloth after the needle has been inserted. Pressing surfaces for holding the cloth were invented by Elias Howe in 1846, and Mr. A. B. Wilson, of the firm of Wheeler and Wilson, subsequently invented the now world-famous four-motion feed. The stitches used in machine sewing where of three distinct kinds. First of all there was the ordinary chain or single thread stitch, the simplest, and for many domestic and light manufacturing purposes the best. Great improvements had of late years been made in the production of this stitch, in consequence of the invention of the rotating looper by Mr. Gibbs, of the firm of Wilcox and Gibbs. By this simple appliance every stitch in the process of formation received a twist which added very much to its strength. These machines are exceedingly rapid, and can be worked as hand machines like the Cleopatra to the speed of 1,000 stitches per minute. The next class of stitch was that produced by two threads each drawn from continuous bobbins without the aid of a shuttle. These are popularly known as the Grover and Baker stitch, one of the best of this class being the Excelsior machine of Messrs. Whight and Mann, which has also the additional feature of feeding or propelling the cloth by a lateral movement of the needle. The third great division was that of the lockstitch machines, whether produced by the shuttle as in machines of the Howe and Singer principle, or by the bobbin and stationary shuttle of the Wheeler and Wilson machines.

Noticing the many rival aspirants for the honour of having invented the first sewing machine, Mr. Newton affirmed that the real inventor of the eye-pointed needle was one Smith, of Leicester, it was introduced into Mr. Newton and Mr. Archbold's patent of 1841, which was applied to the purpose of embroidering the backs of gloves. One of the first sewing machines protected by patent in America was invented in 1842, by John Greenbough, but there is no evidence that it was put into practical operation. In December of 1844, Fisher and Gibbons patented an embroidery machine using two continuous threads, interlooped together for the purpose of producing stitches, while a second arrangement of the same machine produced the lock-stitch by a needle and shuttle; John Fisher being then only a young mechanic of 19. And in 1846, Elias Howe obtained the patent for his machine, which had been commenced by him in the year 1841; a young man of 22, living in a small garret in his native town of Cambridge, State of Massachusetts. Refering to Elias Howe, and the sale of his patent to Messrs. Thomas and Co., of Cheapside, Mr. Wilson ventured to think that, on the whole, Howe was fairly, nay, liberally dealt with by that firm, and was not altogether the martyr he had sometimes been represented. The improvements that have been made upon Howe's original idea by Messrs. Singer, Wilson, Gibbs, and others were then passed in review, and their respective merits fully discussed and lucidly explained. The paper was abundantly illustrated both by diagrams and models, and machines manufactured by most of the celebrated makers, both of English and American, were exhibited in the room. Among others were those of Wheeler and Wilson, Howe, Thomas, Singer, Wilcox and Gibbs, Bradbury, Whight and Mann, Weir, Newton Wilson, Shakespeare, Wanzer, Grover, Judkins, Baker, and a number of others. A novel invention, in the shape of a plaiting attachment, which has recently been patented by Mr. Wilson, was also exhibited.

The chairman having invited discussion, Mr. Alexander observed that he thought the claims of Walter Hunt, of New York, had been somewhat overlooked by Mr. Newton. Hunt commenced in 1835 to construct a machine using two continuous threads, although he did not succeed in perfecting a practically useful machine. He also referred to the new Bonnaz machine, which he described as being a very ingenious and excellent one for the special purpose intended.

Mr. Clements, of Birmingham, the inventor of the button-hole machine, expressed his willingness on some future occasion to bring before the members of the Institute the substance of the paper read by him on the button-hole machine before the British Association at Birmingham in 1867.

Mr. Mann (Whight and Mann) observed that Mr. Newton had demonstrated that the development of the sewing machine had been quite Darwinian in its manifestation, the glory of it belonged to no one man, but step by step the thing had grown by the assistance of brain and capital to be the great power it is to-day.

A vote of thanks, proposed by Mr. Varley and seconded by Mr. Campin, closed the proceedings; a vote of thanks to the chairman being previously passed by acclamation.

This meeting was attended by a large number of ladies, and was really a very pleasant *réunion*, light refreshments being served in the council room.

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President of Council:

SIR ANTONIO BRADY.

MEMBERS MEETINGS AT 8 P.M.

On Thursday, June 3rd, Davis, Esq., "On Safety Appliances for Hoists and Lifts;" P. Egerton, Esq., "On a Universal Revolving Spindle."

Council and Executive Meeting on the same Evening at 7 p.m.

Subscriptions are payable to Mr. G. A. STRETTON, the Receiver, 4, St. Martin's-place, S.W., who is the proper official to give receipts. F. W. CAMPIN, Sec.

Proceedings of the Institute.

On 6th May the Council and Executive Committee met, F. H. Varley, Esq., President of Council, presiding. After confirmation of minutes of last meeting, the question of the new rules was discussed, and it was decided that the new rule 13, suggested by the Rules Committee, needed modification, and Mr. Carttar gave notice that he should move the substitution of the following for the rule suggested by that Committee:—"That the Institute shall not, by its officers or otherwise, interfere in the business of Patent Agency in any way, such interference being contrary to the spirit and fundamental objects of the Institute." The question of the public conference was discussed, and arrangements made in regard thereto. The accounts were ordered to be made out, and balance-sheet audited, prior to the Annual General Meeting on 28th May.

At the Council Meeting preceding the Annual General Meeting the report of Council (which we give on the first page) was read over, approved, and ordered to be presented to that meeting.

The proceedings at the Annual General Meeting we give as first article.

The names of the members of the new Executive Council will be given in our next.

Monthly Notices.

The Chemical News of May 7th commences the translation of a report, by Dr. A. W. Hofmann, "On the Development of the Chemical Arts during the last Ten Years."

In the ascent of the Zenith balloon M. G. Tissandier found that at the height of about 2,890 feet, at the zero of centigrade, the amount of carbonic acid in 10,000 parts of air was 2·40.

Rich beds of coal have been opened in the Straits of Magellan, at a place called Vaqueria, by Captain Corey. There are three beds of very compact black coal, having an aggregate thickness of 26 feet. Probably it is of Tertiary age.

Diamond Rock Drill Boring was the subject of a communication by Major Beaumont at a meeting of the Institution of Mechanical Engineers, recently held in Westminster, when the Major stated that at Messrs. Bells' works, at Middlesborough, they completed a bore-hole to the depth of 1,355 feet in 210 working days, of nine hours each, passing through a bed of solid salt more than 100 feet in thickness.

The Iron and Coal Deposits at Wallerawang.—About 105 miles from Sydney, according to Prof. A. Liversidge, of the Sydney University, within a circle of some four miles diameter, there are extensive deposits of rich iron ores of good coal and abundance of limestone. It may, therefore, be safely predicted that in a few years Wallerawang will become an important iron-making district.

The tempered glass of M. de la Bastie is proposed to be applied to safety lamps for the use of colliers. It is a peculiarity of this toughened glass that it is not easily broken; but it appears that by sudden cooling it is rapidly reduced to powder. M. Chanselle of the St. Etienne Society of Mineral Industry, proposed, as we understand the *Revue Iudustrielle,* to obviate this objection by engraving on the glass lines of less resistance. M. Euverte attempts to show that the annealing of glass by De La Bastie's process has a great analogy to the tempering of steel by oil as for artillery.

The Iron and Steel Institute held its annual general meeting during the past month in the rooms of the Institution of Civil Engineers, 25, Great George-street, on Wednesday, Thursday, and Friday. On Wednesday the Report of the Council for the year 1874 was submitted. The election of President, Vice-Presidents, Members of Council, Officers, and New Members took place, and Mr. Menelaus delivered his inaugural address as President. Mr. Warington Smyth lectured "On the Ores of Iron considered in their Geological Relations." Mornings were devoted to the reading and discussion of papers. Among the papers are "Notes of a Visit to Mines and Ironworks in the United States," and the "Sum of Heat Utilised in Smelting Cleveland Ironstone," by Mr. I. Lowthian Bell, F.R.S.; "The Estimation of Small Quantities of Phosphorus in Iron and Steel by Spectrum Analysis," by Sir John G. N. Alleyne, Bart.; "The Manufacture of Bessemer Steel in Belgium," by M. J. Deby. The summer meeting will be held in Manchester early in September.

Suppression of Dangerous Aerostation.—We read the following in the *Athenæum:*—M. Faye has addressed a letter to the President of the French Academy on the subject of the recent loss of life in scientific aërostation, which will, we think, be read with interest and command approval. He proposes that the Academy should fix a limit of elevation, beyond which no ascent having a scientific object in view should be allowed to go, or its results received by them. "In my opinion," he says, "the extreme height of 7,000 metres answers all the serious needs of modern science. The atmosphere extends, indeed, more than 28 leagues beyond that: for the observations of shooting stars, of which the extreme point of inflammations is nearly 120 kilomètres (about 75 miles) in height, assign a thickness of 30 leagues to the aereal stratum which surrounds our globe. But of these 30 leagues, the first two only are of importance, and it is not the exploration of a kilometre more or less which can seriously influence the progress of science. Yet this kilometre the more implies the temporary annihilation of our faculties, and perhaps death. . . . Observations made in danger of death, or whilst fainting is imminent, can be of no real benefit to science. For my part, I believe that this scientific *ne plus ultra,* if laid down by the Academy, would be fully accepted by the aeronauts of all countries, and above all, by the friends of science who encourage and patronize their useful expeditions. There will still remain sufficient perils to face to please those intrepid souls to whom danger only forms one attraction the more."

Proceedings of Societies.

ROYAL SOCIETY.

APRIL 22ND.—J. Evans, Esq., V.P., in the chair.—The Right Hon. R. Gurney, Q.C., was elected a Fellow. The following papers were read:—"The Action of Heat on the Absorption Spectra and Chemical Constitution of Saline Solutions," by Mr. W. N. Hartley,—and "On Attraction and Repulsion resulting from Radiation," part 2, with supplement, by Mr. W. Crookes. Mr. J. N. Lockyer communicated some particulars of the eclipse of the sun as observed at Bangkok, Siam, on the 6th of April last.

April 29th.—The Duke of Devonshire, K.G., V.P., in the chair.—The Right Hon. Sir J. Colvile was elected a Fellow. The following papers were read:—"Some Particulars of the Transit of Venus across the Sun, 1874, December 9, as observed at Mussoorie on the Himalaya Mountains," Note No. 2, with appendix, by Mr. J. B. N. Hennessey, and "On a Continuous Self-registering Thermometer," by Mr. W. H. Cripps.

May 13th.—Dr. J. Burdon-Sanderson, V.P., in the chair.—The Croonian Lecture, "Experiments on the Brain of Monkeys," Second Series, was delivered by Prof. Ferrier, M.D.

ROYAL INSTITUTION.

MAY 1ST.—Annual meeting.—Warren De la Rue, Esq., V.P., in the chair. The annual report of the Committee of Visitors for the year 1874 was read and adopted. The following gentlemen were elected for the ensuing year:—President, the Duke of Northumberland; Treasurer, G. Busk; Secretary, W. Spottiswoode; Managers, W. Bowman, Admiral Sir H. J. Codrington, Dr. Warren De la Rue, the Duke of Devonshire, Sir T. F. Elliot, F. Galton, the Hon. Sir W. R. Grove, C. H. Hawkins, A. Latham, Lord J. W. Percy, W. Pole, Lord Raleigh, Lord A. Russell, Dr. C. W. Siemens, and Sir C. Wheatstone; Visitors, J. D. Allcroft, J. R. Andrews, J. C. Burgoyne, Sir T. F. Buxton, Bart, A. J. Ellis, T. H. Hills, Dr. R. Liebreich, W. Longman, Dr. A. C. B. Neill, Dr. J. Rae, Rev. A. Rigg, J. B. Sedgwick, J. Spedding, G. A. Spottiswoode, and the Hon. J. G. P. Vereker.

May 3rd.—G. Busk, Esq., F.R.S., V.P., in the chair.—The following Vice-Presidents for the ensuing year were announced:—The Duke of Devonshire, W. Pole, and Dr. C. W. Siemens. Mrs. Samuel Joshua, Lieut.-Col. G. F. Whitelocke, the Right Rev. C. Perry, Messrs. G. Critchett, C. Ionides, and H. Joslin were elected members. Prof. Tyndall was re-elected Professor of Natural Philosophy.

ROYAL SOCIETY OF LITERATURE.

APRIL 21ST.—C. Clark, Esq., Q.C., in the chair.—Mr. Vaux read a paper "On Recent Excavations in the Colosseum at Rome," in which he described at considerable length what has been done during the summer and autumn of last year, proving as these works do the accuracy of the judgment on this subject of Mr. J. H. Parker. Mr. Vaux showed that the results of the excavations in the Colosseum proved beyond all question that this building had been originally constructed on the site of the ancient Naumachia of Nero, if not on that of Julius Cæsar, the great work of Vespasianus and Titus having really been the erection of gigantic colonnades and arcades of stone around brick buildings of the earlier Emperors.

April 28th.—Annual Meeting.—The following were elected as Officers and Council for the ensuing year:—President, the Right Rev. Bishop Thirlwall; Vice-Presidents, the Duke of Devonshire, the Very Rev. the Dean of Westminster, Right Hon. Sir W. Erle, Major-Gen. Sir H. C. Rawlinson, H. Fox Talbot, Sir P. de Colquhoun, Sir C. Nicholson, Bart., Major-Gen. Sir C. Dickson, and the Rev. C. Babington; Council, W. A. T. Amhurst, Walter de Gray Birch, E. W. Brabrook, C. H. E. Carmichael, C. Clark, Treasurer; C. Goolden, S. G. Grady, N. E. S. A. Hamilton, Hon. Librarian; R. B. Holt, C. M. Ingleby, Foreign Secretary; C. H. Long, G. W. Moon, H. T. Steward, S. Timmins, W. S. W. Vaux, Secretary; and H. W. Willoughby; Auditors, Rev. T. Hugo and H. Jeula; Clerk, Mr. Ayres; Collector, Mr. G. A. Stretton.

ZOOLOGICAL SOCIETY.

APRIL 20TH.—R. Hudson, Esq., V.P., in the chair.—The Secretary read a report on the additions made to the Menagerie during March, and called particular attention to an indian Wild Dog (*Canis primævus*, Hodgs.) from British Burmah, three Crested Black Kites (*Baza lophotes*), a Himalayan Magpie (*Pica bottanensis*), a Hamadryad Snake (*Ophiophagus elaps*), and a Bearded Falcon (*Falco biarmicus*). Mr. E. R. Alston exhibited and made remarks on a rufous variety of the Murine Dormouse (*Graphiurus murinus*, Desm.) from West Africa. Letters and communications were read: from Lieut. R. J. Wardlaw-Ramsay, dated Tonghoo, British Burmah, 22nd November, 1874, on the Woodpecker (*Gecinus erythropygius*), described by him at a former meeting (*P.Z.S.* 1874, p. 212, pl. xxxv.),—by Mr. W. B. Tegetmeier, on two hybrid Pheasants, the result of a cross between *Phasianus colchicus* and *Euplocamus nycthemerus*,—by Mr. A. H. Garrod, on the structure of the deep plantar tendons in different birds, in which the different modes of arrangement of these tendons were pointed out, and their importance in the classification of the order insisted upon,—from Mr. R. J. Lechmere-Guppy, on the occurrence of *Helix coactiliata* in Trinidad, and on the general distribution of the land and fresh-water mollusca of that island; and a note on the variety of *Bulimus constrictus*, found in Venezuelan Guiana,—from the Rev. O. P. Cambridge, in which he gave descriptions of nine new species of Spiders of the genus Erigone additional to those described in a former communication on the same subject,—and from Mr. G. Gulliver, containing a description of the spermatozoa of the Lamprey (*Petromyzon marœnus*). Mr. R. B. Sharpe exhibited and made remarks on some specimens of rare species of Birds of Prey, lately received by the British Museum from Australia.

THE INSTITUTION OF CIVIL ENGINEERS.

APRIL 27TH.—Mr. T. E. Harrison, President, in the chair.—The paper read was, "On the Systems of Constant and Intermittent Water Supply, and the Prevention of Waste, with special reference to the Restoration of Constant Service in Liverpool," by Mr. G. F. Deacon.

May 4th.—Mr. T. E. Harrison in the chair.—The monthly ballot resulted in the election of thirty-seven candidates, of whom nine were members, viz., Messrs. F. H. Kirby, E. J. Martin, W. D. Nisbet, C. E. P. D. Spagnoletti, R. P. Spice, E. W. Stoney, J. Vauasseur, H. E. Wallis, and J. Williams; and twenty-eight associates, viz., Messrs. D. Balfour, H. Bancroft, C. O. Blaber, J. Burgess, M. W. Carr, jun., C. J. Chubb, C. A. Craven, J. Dredge, F. Elkington, T. M. Favell, A. Fyson, H. E. Hargreaves, J. W. Herring, E. Lynam, J. B. Lynam, J. B. Mackenzie, A. Marshall, J. M'Glashan, E. Parry, J. N. Paxman, E. G. Rivers, S. Sayer, J. Duarte, J. Slate, J. Strain, W. A. M. Valon, J. Watson, C. S. Williams, and H. Williams. The Council have transferred Messrs. W. B. Hall, H. E. Jones, and G. C. Trewby from the class of associates to that of members, and have admitted Messrs. E. H. Clemention, A. W. Cross, W. Douglas, E. F. Gordon, F. R. Johnson, J. Linacre, W. Michell, H. J. Oddie, the Hon. R. C. Parsons, R. Pawley, E. Pinhey, J. Price, H. Richards, R. S. J. Routh, A. Scott, R. Sievewright, R. H. F. Stuart, A. Sulivan, E. B. Taylor, J. H. Wallace, and J. C. White, as students of the institution.

On the 26th of May ult., the *conversazione* took place at the India Museum, South Kensington, when Mr. Harrison (the President) and Mrs. Harrison received a number of highly distinguished persons, and a most agreeable evening was spent.

GEOGRAPHICAL SOCIETY.

APRIL 26TH.—Major-General Sir H. C. Rawlinson, President, in the chair.—The following gentlemen were elected Fellows:—Lord Inverurie, Rev. P. F. Swann; Messrs. A. R. de Beaumont, N. B. Dennys, O. Dickson, C. Ebden, C. W. Everard, J. Grignon, J. Howard, R. Jardine, A. Johnston, J. S. Lister. The paper read was, "Travels in Great Tibet, and Trade Routes between Tibet and Bengal," by Mr. Clements R. Markham.

GEOLOGICAL SOCIETY.

APRIL 28TH.—J. Evans, Esq., President, in the chair.—Rev. W. Williams, Messrs. W. Bragge, G. M. Dawson, J. M. Granville, W. Low, G. F. Thomas, C. O. Williams, and E. Kelly, were elected fellows. The following communications were read:—"On *Stagonolepis Robertsoni*, and on the Evolution of the Crocodilia," by Prof. T. H. Huxley; "On the Remains of a Fossil Forest in the Coal Measures at Wadsley, near Sheffield," by Mr. H. C. Sorby; and "On *Favistella stellata* and *Favistella calicina*, with Notes on the Affinities of Favistella and allied Genera," by Dr. H. A. Nicholson.

PHYSICAL SOCIETY.

APRIL 24TH.—W. Spottiswoode, LL.D., in the chair.—Mr. J. Barrett exhibited an "auxiliary air-pump," which is a modification of Poggendorf's arrangement for obtaining a Torricellian vacuum, and is also allied in principle to the exhauster used by Geissler in the preparation of vaccum tubes. Mr. Barrett also showed a hammer-break for the instantaneous rupture of the current in the primary wire of an induction coil. Dr. W. H. Stone read a paper "On Some Points connected with Wind Instruments." He stated that there were some discrepancies to be noted in the behaviour of air issuing from the side orifices of wind instruments in vibration which deserved attention, and might be accounted for by the laws of efflux. He first showed that the stream from the side hole of a clarionet, when sounding, was sufficient to extinguish a candle, though the musical vibration was obviously in the main tube. The usual mode of tuning these instruments is by introducing a resinous cement into the hole, so as to diminish its calibre. But after a certain point, the rounded surface thus obtained ceased to produce an effect, though a note will still be produced by introducing a cylindrical tube of the same diameter, and this additional tube exercises greater influence than the rounded edge. He was thus led to inquire whether the theorem of D. Bernoulli, or the particular case of it named after Torricelli, could be brought to bear on the question. The *Vena Contracta*, which, in fluid, reduces the efflux to ·62 of the calculated amount, is also to be noticed in gases, the flow of which from orifices is affected by three conditions:—1. The thinness of the wall in which the orifice is made; 2. The shape of the nozzle; 3. Friction in a long pipe. Some mathematical details were adverted to respecting these conditions, and it was admitted that the vibration in a musical tube must also exercise sensible influence. There were, however, two junctions of a side orifice in an instrument, the first to cut off a portion of the tube, and so to raise the pitch; the second, and most usual, to establish a point of non-resistance in the wall of the tube, and thus to act by influencing the longitudinal vibrations. In the organ, peculiar qualities of tone are obtained by these side holes, as in the "viol di gamba" and "keraulophon" stops. In flutes, oboes, clarionets, and others, great part of the tone comes from the bell, even when side holes are open. In instruments where the holes were long, as in the bassoon, the hole itself became a separate vibrating tube. This was shown by introducing tubes of different and increasing lengths into an orifice in the side of an organ reed-pipe. The friction at last became so great, and the secondary wave so strong, that the pipe returned to its old pitch. A reed was also applied to a cylindrical tube, and it was show that a sharp-edged orifice, opened at the middle point of the tube, immediately prevented production of any note whatever, until a cylindrical nozzle was introduced, when the octave was sounded freely; nor was it altered by increasing the length of the nozzle to several inches, though there was then very little efflux through it. The general results are that the function of holes is double; that the pitch of the note emitted varies with their size, shape, and even more with their length; and that the actual severing of continuity in the principal tube is a comparatively minor point. Dr. Stone then inserted three tubes, varying in length from two to six inches, in a cylindrical tube, like that of a clarionet, at right angles to its length, the longest being placed at the centre of the instrument, and the shortest at one eighth from the mouth-piece. The same note was produced when each tube was used singly and when the three were employed. Dr. Stone expressed a hope that a series of experiments would render it possible to develope curves in which the co-ordinates would be the lengths of the additional tubes and their positions in the instrument, and also that a new instrument might be produced, in which the side orifices acted purely as nodal points by the assistance of friction and contracted vein.

ANTHROPOLOGICAL INSTITUTE.

APRIL 27TH.—Col. A. Kane Fox, President, in the chair.—Mrs. A. Morrison, Miss A. W. Buckland, Miss B. Murray, and Mr. L. A. Lucas, were elected members. Mr. F. Galton contributed a note on the height and weight of boys aged fourteen in town and country schools. The principal results showed the comparative heights and weights of those boys who were fourteen on their last birthday in two groups of public schools, and the other of town schools. It appeared that boys of fourteen in the country group were about 1¾ inch taller and 7lb. heavier than those in the town group; also, that the difference of height was due in about equal degress to retardation and to total suppression of growth; and that the distribution of heights in both cases conformed well to the results of the "Law of Error." The Rev. J. Mullens read a paper "On the Origin and Progress of the People of Madagascar." The Malagasy appeared to be a single race; no tribe is to be found secluded in any corner, or in the hill districts, different from the people of the plains or open provinces, such as is met with in India, in Sumatra, and in Borneo; nor is any portion of the people specially degraded. The Malagasy are divided into three tribes, the Betsimisarakas, the Sacalavas, and the Hovas, the latter largely predominating in number and influence. With regard to the origin of the people, the author rejected the theory of Crawford and others, who argued for their African descent. Their language and tribal customs suggested a very different origin. There could hardly be any doubt that the Malay entered largely into the composition of the grammar and vocabulary, and continued researches into the Malay and Malagasy languages gave more and more evidence of their resemblances. The conclusion was, that the Malagasy are a Malay people, following Malay customs, some of them possessing Malay eyes, hair, and features, and speaking a Malay tongue at the present time. They were an intelligent people, orderly, and well governed, and were daily improving, and the author of the paper could see the promise of a great and useful future for them. Mr. J. J. Monterio read a paper, "On the Quisama Tribe of Angolo," which he had written with the object of correcting some erroneous statements concerning them that had been formerly brought before the institute.

May 11th.—Col. A. Lane Fox, President, in the chair.—Mr. S. Davy was elected a Member.—Mr. Moncure D. Conway read a paper, "On Mythology." He maintained that the evolution of mythology was the reverse of what the facts of physical evolution might suggest. It was not from beneath upwards to higher things, but rather from the grand in nature that the human mind had arrived at the association of mystical meanings, with the stock and stone, plants and animals, which figured so largely in popular mythology.—A paper, "On Language and Race," by the Rev. A. H. Sayce, was read. The author held that the fallacy of language as a sure and certain test of race was one to which few modern philologists would commit themselves. There was no assertion which could be more readily confronted with history, or, when so confronted, more clearly be demonstrated to be false Society implied language, race did not: hence while it might be asserted that language is the test of social contact, it might be asserted with equal precision that it is not a test of race. Language could tell us nothing of race. It did not even raise a presumption that the speakers of the same language were all of the same origin. It was only necessary to look at the great States of Europe, with their mingled races and common dialects, to discover that. Language showed only that they had all come under the same social influences. Race in philology and race in physiology meant very different things.—Mr. A. W. Franks exhibited an inscribed wooden gorget from Easter Island.

ASTRONOMICAL SOCIETY.

MAY 14TH.—Lord Lindsay, V.P., in the chair.—Mr. A. C. Russell, the Government Astronomer at Sydney, was called upon to exhibit his photographs of the Tranist of Venus; they showed no trace of the black drop, although a very conspicuous ligament had been seen by many of the observers. In one instance one of the photographers, while looking through the finder of his instrument, saw a ligament form between the Sun's limb and the planet's which appeared to him to be half the planet's diameter in length; he immediately commenced to turn the handle of the Janssen plate, and obtained sixty pictures in the minute which followed his observation, but on none of them was any black drop visible. The planet appeared to be separated from the Sun's limb by a perfectly sharp and hard band of light, which was only about three seconds, or one-twentieth of the diameter of the planet broad. While Venus was upon the Sun's disc, a halo or band of increased brightness was visible all round its limb. This band was estimated by most of the observers to be about twenty seconds in breadth. While the planet was passing off the Sun's disc, its dark limb was seen to be surrounded by a faint line or thread of light, and at one point, which appeared to correspond with the pole of the planet, the thread of light was seen to be brighter and broader: this was noticed and drawn by nearly all the observers. At the Sydney photographic station one hundred and eighty photographs were obtained, and at the station on the mountains they obtained sixty-three whole pictures of the Sun and ten Janssen plates. At the Southern station they obtained forty-three pictures of the Sun, and then it became cloudy. Mr. Stone, the Government Observer at the Cape of Good Hope, was called upon by Lord Lindsay to give an account of his observations of the Transit. As Venus drew near to the Sun's limb he had seen, first, a faint ligament form, which gradually became darker and broader, until at last the planet appeared to be egg-shaped. He could only estimate the true contact by observing the time when the curvature of the limb of the planet appeared to be symmetrical and coincident with the Sun's limb; he had made use of a power of 200 and a very bright field of view. Mr. Stone had not taken any photographs himself, but in one which had been obtained in the colony the body of Venus appeared to be distinctly elongated in a direction at right angles with the sun's limb. Mr. Ranyard suggested that the bright thread of light seen surrounding the limb of the planet, when off the Sun, might be due to refraction of the Sun's rays within the atmosphere of Venus, and that the bright spot which had been observed near the planet's pole might possibly afford very delicate evidence of the greater refractive power of the planet's atmosphere in the colder regions near its pole. A bright band similar to that seen round Venus upon the Sun, had frequently been observed as surrounding the limb of the Moon during partial eclipses; it was, therefore, probably not due to any action of the planet's atmosphere.—A discussion then followed about the relative value of the photo-heliograph and long-focus instruments for taking photographs which were to be submitted to accurate measurement, and Lord Lindsay showed some photographs of the black drop which he had taken on his model of the Transit.

MATHEMATICAL SOCIETY.

MAY 13TH.—Prof. Cayley, V.P., in the chair.—Mr. A. B. Kempe and the Rev. C. Taylor were admitted into the Society.—Messrs. E. H. A. Hunter, E. H. Rhodes, and Dr. W. J. Wright were proposed for election.—The Rev. C. Taylor read a paper "On some Constructions for Transforming Curves and Surfaces."—Dr. Hirst and the Chairman made remarks on the subject, pointing out the fact (admitted by the author in his paper) that the method was closely allied to methods employed by Chasles, in his Treatise on the Conic Sections, and other writings.—Mr. J. W. L. Glaisher communicated a short note on Laplace's Co-efficients.—A paper by Mr. H. Hart, "On a Linkworth for describing Sphero-Conics and Sphero-Quartics," was taken as read.

SOCIETY OF BIBLICAL ARCHÆOLOGY.

MAY 4TH.—S. Birch, LL.D., President, in the chair.—The following candidates were elected members:—Mrs. F. Cable, Monsignor T. Capel, Rev. V. S. Coles, Prof. R. Clark, T. Ely, R. R. Greig, Miss S. Harris, Rev. H. T. Kingdon, Rev. G. Keime, Admiral Ommanney, W. Payne, Canon Prothero, J. J. Ranson, and Miss Woodrooffe. The following papers were read:—"Commentary, with Notes, on the Deluge Tablet," by Mr. H. Fox Talbot; "On an Historical Inscription of the Tenth Expedition of Esarhaddon," by Mr. W. Boscawen; and "On the Lishana-shel-Imrani, the Modern Syriac or Targum Dialect of the Jews in the vast Territories of Ancient Media and Assyria, with some Account of the People by whom it is Spoken," by the Rev. A. Lowry.

LONDON ANTHROPOLOGICAL SOCIETY.

ON the 23rd inst. the first of a course of special meetings of this society was held at No. 1, Adam-street, Adelphi; the Vice-President, H. B. Churchill, Esq., in the chair. There was a numerous attendance. The list of new fellows elected, books, &c, received since the 9th having been read, Mr.

John Ekless described a subterranean passage recently discovered in Cambridgeshire, and apparently used for burning human bodies at, or about, the period of the Roman occupation. Mr. Carmichael, M.A., F.R.S.L., described some Gallo-Helvetic sepultures, containing bronze and iron weapons, &c., recently discovered at Zurich, and also some very interesting results of "Cave-Hunting" in Southern Italy. Mr. Lewis read a paper entitled "Anthropological Notes on Assyrian Inscriptions," in which, after a preliminary glance at the general history of Nineveh and Babylon from an anthropological stand-point, he drew attention to some apparent coincidences in mythological and other beliefs and practices of the Assyrians, the ancient Celts of Western Europe, and the present representatives of the latter.

GENERAL CONFERENCE ON THE NEW PATENT LAW BILL.

A CONFERENCE, called by the Inventors' Institute, took place on 25th May at the Society of Arts, to consider and take action as to the course to be pursued to amend the Patents for Inventions Bill, now before Parliament, which inventors assert will, if passed in its present form, be very injurious not only to them but to the commercial and industrial interests of the country.

Besides members of the Inventors' Institute there were present members of the Society of Arts, of the Institute of Civil Engineers, and representatives from the Artizans' and Inventors' Patent Bill Amendment Committee, the London Patent Agents' Com- the Trades Congress and various Trades mittee, the Parliamentary Committee of the Councils, amongst others, Manchester, Rochdale, Preston, Oldham, Sheffield, Walsall, Liverpool, Messrs. Caiger, Tobacco Trades; Bailey, Amalgamated Tailors; Wadkinson, Boilermakers; G. Odger and G. Shipton, London Trades Council; Alfred Walton, Stonemasons; Povey, Maidstone Trades.

Sir Antonio Brady, on the motion of Mr. F. W. Campin, seconded by Mr. Calley, was voted to the chair, and Mr. Campin acted as secretary. Sir Antonio said that a few months since the Inventors' Institute went to the Lord Chancellor to ask him to reform the patent laws in the sense of simplifying the law and cheapening patents, putting them on the footing of the American laws, which were very satisfactory. Our patent laws had been defined as a licence to go to law, and it was very much to be feared that if the present Bill passed every possessor of a valuable patent would have to go to law to defend his patent. Desiring to test the opinion of inventors on this matter, he had called a meeting at his offices in the City, where the Inventors' Institute, the London Patent Agents, the Artizans' and Inventors' Committee, and the Parliamentary Committee of the Trades Union Congress had been represented, and it was resolved that the new Patent Bill was to be objected to on eleven material points.

Dr. Collyer moved the first resolution:—"That the Patents for Inventions Bill, now before Parliament, contains such highly objectionable features that if passed as it now stands it will work injury, not only to inventors, but also the industrial progress of the country." He suggested that every inventor should have the exclusive right for two years of taking out certificates of improvements in working his patent.

Mr. Matthew Prior, of Sheffield, seconded the resolution, declaring that the present Bill would have the effect of driving the best practical inventors from this country. All that was wanted was to increase the examiners and to put the 11th clause of the Bill into force.

Several other gentlemen spoke in favour of the resolution, all denouncing the Bill in the most emphatic manner.

A lady inventor, Mrs. Lewis, objected to the Bill, that it both stopped inventive power, and made the practical carrying out of an invention more difficult instead of more easy. There should be no examiners; there should be permission to make alterations within certain limits of time, and expense of patents should be minimised.

The resolution was carried unanimously.

Mr. Thomas Paterson moved the second resolution:—"That the Patents for Inventions Bill is, amongst other points, highly objectionable, first, in regard to the examiners and their duties, especially as it empowers them to decide as to the utility or frivolity of inventions, and provides for the publication of their reports; secondly, that it abolishes provisional protection upon a provisional specification without providing any substitute effecting the same object; thirdly, as it tends to reduce the term of letters patent to seven years; fourthly, as it forfeits patents because licences have not been granted or the invention worked within a very limited period; fifthly, that it empowers the commissioners to compel the deposit of models; and, sixthly, because the Bill does not appreciably reduce the cost of patents, which cost, as regards the first or provisional stage, ought to be very trifling."

Mr. William Smith, C.E., seconded the resolution, and declared that the present Bill, even with all the improvements adopted by the Lord Chancellor, was still open to such serious objections that unless purified in the fiery furnace of the House of Commons it would do more harm than good. He objected strongly to the examiners, and suggested an increase of the present staff of the Patent Office, and the lowering of the cost of protection to £10 for the first year, and then £5 a year for the term of 21 years.

Mr. W. H. Pendred, C.E., and Mr. W. E. Newton, the well-known patent agent, also stated their general approval of the resolution.

Mr. Mundella, M.P., said his own feeling was as strong as any which had been expressed there—that the Bill, as it stood at present, would be ruinous not only to inventors, but would strike a blow at the best interests of the trade and commerce of the country. He said that quite irrespective of any question of party politics, for he believed they had as many opponents on one side in politics as on the other. Nothing had been more painful to him than to read the remarks of noble lords who called themselves Liberal during the discussion on the Bill. He hoped, therefore, they would find as much support from the ranks of the Government as from the ranks of the Opposition to put an end to the mischief. He was not a mere theorist, for, though not an inventor himself, he had been the partner of inventors for more than 30 years. Forty years since, when he was apprenticed, every process of his trade had been pursued with the utmost physical labour for a miserable remuneration; but he had lived to see the whole of that revolutionised by inventions. The sons of the men who laboured so severely for such miserable wages were now earning seven or eight times more than their fathers, and there had, moreover, been an immense increase of employment both for them and for other countries where the processes of the same manufacture were carried on. He had the conviction, therefore, that it was not for the mere protection of inventors, but in the best interests of public policy that the best scheme possible ought to be devised to encourage and foster invention. He thought expense was of great importance in the question of invention, because in more than one instance the most important inventions were made by working men. He had found in a garret the most important invention in his own trade, where the workman had for years starved himself to carry out his invention, and to whom £10 was as impossible to raise as £10,000. It seemed to him, therefore, that one of the first considerations for the promotion of invention was to protect the inventor at the smallest possible cost in the preliminary stage. (Hear.) So that a poor man could go to the world and say that he had an invention which was secured, and was prepared to receive offers for it. (Hear.) The first speech he had made in the House of Commons was on a crude motion for the abolition of the patent law, in opposition to the present Lord Selborne and Mr. Macfie. In that noble lord it surprised him to find one unaccountable obliquity, in regard to patents. He had said there was great difficulty about inventions and about protection of inventors. But so there was great difficulty about the protection of all property, and there was no means of coping with those difficulties except by abolishing patents altogether. A very clever working man, writing to him on this point, had said, "I see noble lords tell us that the only chance we have of getting rid of all difficulty connected with patents is by abolishing them altogether; I suppose they were speaking of patents of invention and not patents of nobility." (Cheers and laughter.) He had heard indications of a stronger feeling on the part of intelligent working men of this country on this question than on almost any other. He was delighted to see the meeting, for it was a fair exponent of the feeling of working men inventors throughout the country, and it represented the backbone of our manufacturers, whose exports exceeded that of all other nations of the world put together. The objections were stated fairly in the resolutions which had been moved. The hon. member gave some striking illustrations of the consequence of allowing any set of referees to decide on the novelty or utility of any proposed patent, and how unlikely it would be that either inventions would be fostered or that patentees would be remunerated if the term of protection were only limited to seven years; and of the effect of the compulsory licensing system. In the House of Commons, however, he said, these questions were very little understood, and all they could do would be to make the best fight possible. Mr. Dillwyn had agreed, in concert with himself, first to put on the paper a notice to read the Bill that day six months; but he did not wish to get rid of it altogether if they would only consent to amend it. But rather than have the present Bill he would prefer to retain the old one a thousand times over. They would raise all the discussion that was possible on the second reading, and in committee Mr. Forster, who had been well posted on the subject, had given notice of amendments against the provisional specification and against compulsory licences, and he hoped they would succeed in convincing gentlemen on both sides of the House that the best interests of the country were opposed to the objectionable clauses of the Bill. At any rate he had the conviction that he could not do a better service to his country or to the best interests of British industry and to the interests of the consuming public, than to get rid of those clauses, to cheapen patents, and to encourage invention, in the full belief that the same benefits would accrue to the country in the future that had resulted from the inventive activity of the last half century. (Hear, hear.)

Mr. Lloyd Wise, C.E., supported the resolution, remarking that the publication of the reports of the examiners he felt strongly opposed to, as an erroneous decision by them published abroad would be likely to destroy an inventor's chances almost as much as the refusal of the patent.

Mr. J. W. Gray also supported the resolution from a similar point of view.

Mr. Hume Williams deprecated the disposition which appeared to exist to get rid of the Bill altogether, arguing that it was capable of being greatly improved and being made very useful to the best interests of inventors.

After some further discussion the following resolution was unanimously adopted, being moved by Mr. H. Varley and seconded by Mr. M. M. Harris:—

"That petitions to the two Houses of Parliament, embodying the former resolutions, be prepared and signed by the chairman and secretary on behalf of this meeting."

The last resolution was as follows:—

"That the Council of the Inventors' Institute be requested to watch the Bill during its course through Parliament, and endeavour to secure the views of this meeting being carried out."

This was moved by Mr. Carttar and seconded by Mr. Gray, and carried unanimously.

A vote of thanks to the chairman terminated the meeting.

SAVING LIFE AT SEA BY SAFETY APPLIANCES.

By S. Calley, Esq.

At the meeting of the Inventors' Institute on the 22nd April, when Thomas Brassey, Esq., M.P., occupied the chair, Mr. Calley read the following paper on the above subject, as far as it related to lowering boats from the ship:—

The paper I shall have the honour to read before you this evening refers to a new apparatus for lowering ships' boats, a subject of the greatest importance, and one which has long engaged the attention of practical and scientific men from the difficulty of lowering boats at sea without great danger.

Various and numerous plans have been proposed for that purpose; but hitherto those plans have mostly been to lower boats by tackles, and to disengage those tackles in the boat by hooks or by more or less ingenious mechanical contrivances. But all those plans are liable to the one great defect of sometimes not being workable on many occasions when most required, as, for instance, when panic or insurbordination prevail amongst the crew or passengers of a ship, whether she is stranded, on fire, or sinking, and people rush madly down by the tackles, while the boats are lowering, at the risk of having their fingers torn off in the blocks, and endangering their lives; or people crowd in numbers down the ship's side into the boat before it touches the water. There is then but little chance of properly managing the best or most ingenious contrivance that requires to be worked in the boat before the tackles can be freed.

There is also the danger of not being able to disengage both the tackles of the boat at the same time, or from the boat having to lie alongside the ship, exposed to the wash of the sea against her side before the tackles are free. This in the first case has frequently caused one end of the boat to be hoisted in the air, whereby the passengers are thrown out into the sea, and in the second case, besides the former risk, the boat is liable to be stove in, and sunk against the ship's side with all on board.

To remedy this, the plan I exhibit here to-night (which is the joint production of Mr. H. H. Share and myself) does not require anything to be done in the boat after the lowering commences, as everything is done in the ship. Provisions, water, and what else is required, is put in the boat, and passengers take their places in the same, previous to lowering, and from that time nothing is required to be done in the boat before she is perfectly free in the sea, and clear from the ship's side.

The boat, while lowering, follows a circular motion with the frame, and thereby descends into the sea at a distance of twelve to sixteen feet clear from the ship's side, according to the state of the sea and the size of the frame.

Having the boat so far clear off the ship's side when lowered, alone presents enormous advantages, which are increased, when we consider that if there is any discipline at all on board a ship, whether on fire, sinking, or stranded, that such discipline can be much better enforced in the boat before it is lowered than it can be enforced after it is lowered, and laying alongside the ship.

Among other advantages this plan possesses is the great celerity with which a boat can be lowered by it from the ship's side into the water, which is of the utmost importance, especially in collisions at sea, and when any person falls overboard, as in such cases every second of time is precious, for while by the present plans in use, it takes several minutes to get the boat free on the water, say from five to six minutes, and then only against the side of the ship, by this plan the boat can be lowered and also free from the ship's side in less time than one-half minute.

In the case of collision, such as happened to the ill-fated ship, Northfleet, off Beachy Head, there were numbers of landsmen on her deck when the collision occurred who, from not being acquainted with overhauling ship's teakles, were unable to get the boats lowered before she went down; but had the ship's boats been suspended in frames on the principle of the one now exhibited, in all probability some, if not the greater part, of those persons on her deck at the time of the collision would have been saved. And in the case of a man falling overboard on a dark stormy night at sea, the advantages of this plan are very striking, for although every nerve is strained *to rescue the drowning man by all who hear the cry of "A man overboard" ring through the ship*, yet the means at present available give him but a small chance of life, for when we consider that ordinarily it takes about the same or a longer time to pull to the man as it does to lower a boat free from a ship into the water, it must be evident that with this plan, by which a boat can be lowered from the ship's side in less than a tenth part of the time, the chances of being rescued from drowning are immensely in his favour.

For ladies visiting yachts or other vessels in boats this plan is peculiarly adapted, as instead of having to climb a ship's side, which is now requisite, the boat could be placed in the frame when the water is smooth, and the boat and passengers hoisted up on deck, and the same can be done with passengers for steamers, and all other vessels in harbours and rivers in calm weather.

The principle of this invention consists in uniting two davits, by which great strength is acquired, and in forming notches at the back of the two davits, from which a boat would slip off those notches into the sea when lowered; and by this arrangement one man can lower a boat. This frame is fixed to the ship's side by strong hinges placed a short distance above the water line, which can be arrrnged by slides fastened vertically to the ship's side; and, as the frames would exceed fourteen feet in height from the hinges to the notches where the boats rest, the boat would be off the ship's side not less than twelve feet when it reaches the water.

The frame must be sufficiently wide to allow the boat to be suspended by spills overhanging each end of the boat, which would rest in the notches before described; and it would be made with or without the ring shown in the model, or in any other approved manner.

It could also be made at a cheap rate for collier vessels or similar craft, or it may be made ornamental for yachts or other ships if so required.

The lowering gear would be by hand for small and empty boats, but for life-boats or large boats laden with crews, passengers, or otherwise, winding gear on the principle of a windlass or crab-winch is recommended.

The boats for these frames should by preference have a rake both stem and stern, and could be secured in the ordinary way when in their notches, or could be secured to the frame itself by placing thimbles in the keel of the boat.

The iron work to be fastened at both ends of the boat need not be longer than to allow the proper management of the rudder, which should be kept shipped at all times. The spills to suspend the boat on the frame need not exceed a few inches long, and the arrangement of the ironwork could be on any approved plan

The two spills in the frame would only slightly project, and should be made movable; these spills may be made of iron or material.

The frames could be lowered slowly or quickly in smooth waters, but in stormy weather and when there are heavy seas running, they should be lowered swiftly, and the quicker the better.

The frame can be made of any shape required for the sterns of vessels, or to carry a boat directly over the bulwarks, or clear of the same, and over the ship's decks.

This frame can be fastened to the ship's rail by a parrel or by any other contrivance.

Mr. Batten was called on by the chairman to explain the invention, models of which were placed on the table. By these models, the invention known as Captain Clifford's boat-lowering apparatus, was explained. It is unnecessary to do more than allude to this.

Mr. A. Wood's plan for saving life at sea was then explained by Mr. T. Morgan, as consisting of two pillows made in the usual way, except that they are constructed of a peculiar material. When applied, which they can be in a few moments, they are so buoyant that they will sustain a heavy man breast-high in the water, leaving the arms at perfect liberty, so that he can, if required, use them for the purpose of swimming; these pillows also form a protection to the person in the event of being exposed to drifting wreckage, or dashing against rocks, such protection being secured both in front and at back, as will be seen by referring to the illustration on our front page. In some recent cases of shipwreck if these pillows had been used not a single life need have been sacrificed. This would have been specially the case with regard to the Ville du Havre and the Northfleet. In the first instance, the ship was lost in mid-ocean with another ship standing by. With regard to the Northfleet, that was within sight of Dover Cliffs, and in both cases all that was required was something to enable passengers to keep afloat for a short time, for want of which great loss of life occurred. Another lamentable and very recent case is that of the Schiller, where doubtless, if these life-preserving pillows had been on board, we should not have had occasion to lament the great loss of human life which then occurred.

Sir A. Brady said that he thought those present must feel much obliged to the gentlemen who had come forward and explained to them their plans for saving life at sea. It was a great question for a maritime people as we were; hence such inventions as these ought to meet with every encouragement.

After some general remarks on the subject and an allusion to Mr. Plimsoll and his legislative action on the shipping question, Sir Antonio moved a vote of thanks to Mr. Calley and the other gentlemen before the meeting. This having been seconded by Mr. Carttar, was carried unanimously.

Mr. Calley briefly acknowledged this vote of thanks on behalf of himself and the other gentlemen.

Mr. T. Brassey, M.P., then said he was glad to be present that evening, as he took great interest in all things relating to ships. Many plans had been invented for the purpose of lowering boats at sea, and also as to the saving of life at sea, and those explained there that evening were, he thought, worthy of public attention. The number of plans he had had submitted to him were more than he should like to state, but it was from practical experience that an invention should be judged; for, if it failed at the critical time, what was its use? But some plan of lowering boats with facility was a thing that was urgently needed, and he should be very sorry to find such an important question neglected by inventors, who were, in his estimation, always worthy of consideration and encouragement, because of the great public advantage that accrued from their labours. The great services rendered by Mr. Plimsoll in his efforts for saving life at sea had been referred to that evening by Sir Antonio Brady, and everyone must be greatly indebted to him for those services; for, if satisfactory remedies were adopted on board ships as to not only the various arrangements for saving life, but also as to over-loading vessels, we should, he was sure, not have those lamentable cases of losses of ships at sea and all on board, which we had daily to deplore; and, therefore, the sooner satisfactory legislation on this question was accomplished, the better. The subject has engrossed attention more than once in the House of Commons, committees being appointed to enquire into it, and it was cheering to feel that something for good may eventually arise out of the agitation that Mr. Plimsoll has kept up for the last year or two. Mr. Brassey then explained the various legislative proceedings that have been taken, and are still going on, for benefiting the condition of our seamen, and these, he thought, would, to a great extent, abate the enormous sacrifice of life which now occurs. The question of the load-line of a ship in regard to overloading was also most important, for there was no doubt many ships were lost for the want thereof, and he hoped before this session was ended some provisions would be made as to the load-line of ships. The question of ship insurance was also one which must engage the attention of Parliament, but he thought the House had sufficient for one session in the Merchant Shipping Bill now before them, and, therefore, we must feel content. In conclusion he observed that he had the greatest pleasure of being present that evening to see the important inventions that had been submitted to the meeting.

Sir A. Brady said that those present must be very thankful to Mr. Brassey for presiding at the meeting, and also for the able address that they had had the pleasure in hearing from him. He, therefore, would propose a vote of thanks to Mr. Brassey for presiding that evening.

Mr. F. W. Campin had great pleasure in seconding the vote of thanks, which was carried unanimously, amidst much acclamation, and with this the proceedings terminated.

THE LIFE-BOAT SERVICE.

The Annual General Meeting of the friends and supporters of the Royal National Life-boat Institution was held on Tuesday, the 11th ultimo, at the Mansion House, London, by the kind permission of the Right Honourable the Lord Mayor of London, his Royal Highness the Duke of Edinburgh, K.G., presiding. The meeting was most influentially and numerously attended. After the President had addressed the meeting, Richard Lewis, Esq., secretary to the Institution, read the annual report, which commenced by saying that the committee of the Royal National Life-boat Institution, in presenting their fifty-first annual report to its supporters and to the public of the British Empire, felt thankful that they were once more able to announce the unabated success with which it had prosecuted its mission. Since the last report the Institution had placed twelve new life-boats on the coast—five of them at new stations, and the others replacing old or inferior boats. Seven of them had been provided with transporting carriages, and six new boat-houses had been built. During the past year the society's life-boats, which are now 250 in number, had saved *five hundred and forty-three* persons, nearly all of them under perilous circumstances, when ordinary boats could not have effected their rescue, or could only have done so at extreme risk to those on board them. These invaluable services since the last annual meeting had happily been rendered without any loss of life amongst the brave men who had performed them. It was satisfactory to know that, as far as the operations of this Institution are concerned, the violence of no storm appalled the brave men who manned the life-boats. On the contrary, there had been services amongst them of the grandest character, and particularly during the heavy and continuous storms of December last, when the life-boats saved 122 lives and 4 vessels. During the past year 11 silver medals, 18 votes of thanks inscribed on vellum, and £2,413 had been granted by the society for saving 543 lives by life-boats, and 170 lives by fishing-boats and other means. The number of lives saved from its first establishment to the present time either by its life-boats or by special exertions for which it had granted rewards was 22,866. Language failed to express adequately the gratitude which every one must feel who ponders over this noble list of lives saved, and the instinctive thankfulness that rises up in the heart that such great work has been accomplished on our shores. Since the formation of the Institution it had voted 91 gold and 863 silver medals for saving life, besides pecuniary rewards to the amount of £45,200. The committee cordially acknowledged the continued co-operation of the Lords Commissioners of the Admiralty, the Admiral Superintendent of Naval Reserves, the officers and men of the Coastguard Service, and Local Branch Committees and their Honorary Secretaries, and the coast boatmen and fishermen. The efforts of the Board of Trade in the maintenance and extension of the rocket apparatus on the coasts of the United Kingdon were unceasing. Many very liberal donations and legacies received during the past year were gratefully acknowledged. The total amount of the receipts in that period had been £33,500 14s. 2d., and of that sum £7,213 was the result of special gifts to defray the cost of ten life-boats. The expenditure, including liabilities, had amounted to £32,368 17s. 7d. The items of receipt and expenditure were detailed in the financial statement annexed to the report, audited as usual by Mr. Lovelock, public accountant. Entering on the fifty-second year of its existence, the National Life-boat Institution in the maturity of its strength and experience had every encouragement to pursue its career of active work with unabated vigour and undiminished confidence; and, resting entirely on the sympathy and support of the British public and on the continued blessing of Almighty God, the Institution was determined to put forth its utmost and unceasing efforts, aided by its coast coadjutors and its experienced staff of officers, for the preservation of life from shipwreck on the coasts of the United Kingdom.

The report having been moved and unanimously adopted, resolutions in furtherance of the objects of the Institution were proposed and seconded by Lord Lawrence; Count Schouvaloff, the Russian Ambassador; the Lord Mayor; the Earl Percy, M.P.; Thomas Chapman, Esq.; Admiral Sir Walter Tarleton; the Earl Fortescue; Lord Lisgar; Sir Edward Perrott, Bart; and George Lyall, Esq.

His Grace the Duke of Northumberland, as President of the Institution, then moved a cordial vote of thanks to H.R.H. the Duke of Edinburgh for the able manner in which he had presided over the meeting, and for the warm interest he took in the welfare of the Society, and availed himself of the opportunity of presenting to their Royal Highnesses, on behalf of the British residents at St. Petersburg, two beautiful silver mounted models of the two fine life-boats given by the residents to them as a wedding present.

The vote was seconded by Admiral Sir William Hall, K.C.B., and carried by acclamation.

His Royal Highness in reply said—The Duchess of Edinburgh joins with me in asking that your Grace will have the goodness to convey to the ladies and gentlemen—residents of St. Petersburg—for whom you now act, our very sincere thanks for the beautiful and very interesting models of the life-boats which, at the time of our marriage, were named after us, and stationed on the shores of the Baltic and the Black Sea. I am glad to see here on this occasion Captain Kopitoff, of the Russian Imperial Navy, who has rendered in this country valuable services to the Russian Life-boat Society, and who has watched with close interest the construction of these life-boats. I have the honour myself to be a member of the Russian Society, of which the Czarevna is President, and I can answer for the interest which her Royal Highness takes in its welfare. (Cheers.) I am much obliged to you for the resolution you have just been pleased to pass, and I can assure you it has given me great pleasure a second time to preside at the annual meeting of the National Life-boat Institution. (Loud cheers.)

The proceedings then terminated.

NEW RULES OF THE INVENTORS' INSTITUTE.

The following is the full text of the new annual rules referred to in the report of the Council to the general meeting:—

No 1. The association shall be called "the Inventors' Institute," and shall consist (subject to these rules) of inventors, patentees, and others desirous of improving the manufactures of this country, who shall subscribe annually not less than one guinea, or who shall pay a life subscription of not less than ten guineas, and of such honorary members as may be elected by the members, after recommendation by the Council.

No. 2. The Institute shall endeavour to unite and organize the influence of inventors, patentees, and others, for the purpose of protecting their interests, and defending the privilege of obtaining Her Majesty's letters-patent; of promoting improvements in the Patent Laws; and of facilitating the diffusion of useful information with reference to inventions, and other subjects beneficial to inventors and patentees.

No. 3. The Institute shall be under the management of an Executive Council, consisting of the president, vice-presidents, treasurer, and twelve other persons, elected from and by the members, one-third to retire annually by rotation, but to be eligible for re-election.

No. 4. The Executive Council shall meet at least once a month, and five members, which may include the secretary, shall form a quorum. Notice of each meeting shall be given by the secretary, by post, at least seven days previous to such intended meeting.

No. 5. Regular minutes of the proceedings of the Executive Council shall be kept, and a fair copy of those of the preceding one shall be submitted for confirmation at each meeting.

No. 6. The Executive Council shall have the general superintendence and entire management of the Institute, and shall have power, whenever ten members are present, to exclude or remove any person whose membership may be thought detrimental to the Institute—subject, however, to the right of the excluded or removed person to appeal to the general body of the members at their next annual meeting.

But no member shall be excluded or removed without previous notice having been given to him that a motion to that effect is intended to be made; nor except by a majority of four-fifths of the members of the Executive Council present at the meeting when such motion shall be discussed.

No. 7. It will be the duty of the Executive Council to render the Institute an effective expression of the position, rights, and requirements of inventors and patentees, and of the opinions of members upon all Bills in Parliament proposing any alteration in the law relating to inventors, and to take such practical steps in furtherance of these objects as it may deem expedient; but the Executive Council shall not take any steps for the introduction of any Bill into Parliament until the principle of it has been submitted, and approved by a general or special meeting of the members held for that purpose.

No. 8. An annual general meeting of the members of the Institute (notice of which shall be sent by circular to every member) shall be held in London, or in one of the principal towns of the United Kingdom (as may be appointed by the Executive Council) for the purpose of receiving the report of the Executive Council, electing the officers and the Executive Council of the ensuing year, and transacting any other general business of which due notice shall have been given.

No. 9. The general council to be elected annually at the general meeting will consist of the presidents and vice-presidents, and the Executive Council, *ex officio*, and such other persons as having been proposed by the Executive Council shall be elected by the members in general meeting. The general council shall be summoned on such occasions (not less than once a year) as the Executive Council shall think necessary. Such meeting to be held, when possible, immediately previous to the annual general meeting.

No 10. The other business of the annual general meeting shall consist solely of such as may arise from the report of the Executive Council, or of which notice shall have been given to the Executive Council, at least one month previously, by any member of the Institute.

No. 11. A special general meeting, of which a week's notice, specifying its object, shall be given by circular, may be called by the Executive Council at any time.

No. 12. No paid officer of the Institute to have a vote in the Executive Council in reference to financial matters.

No. 13. No cheques shall be drawn except by previous vote of the Executive Council, and countersigned by the chairman of the council at which such payment shall be ordered.

No. 14. That the Institute shall not, by its officers or otherwise, interfere in the business of patent agency in any way, such interference being contrary to the spirit and fundamental objects of the Institute.

No. 15. The balance-sheet of the Institute shall be made up at the end of each financial year, and shall be audited and published in such manner as the Executive Council may determine, but so that each member of the Institute may be able to satisfy himself that its funds are properly administered.

MEETING OF DEPUTATIONS FROM VARIOUS BODIES ON THE NEW PATENT BILL.

At a meeting convened by Sir Antonio Brady at his office, 110, Cannon-street, E.C., 28th April, as a conference preliminary to a public meeting of inventors and others interested in the progress of industrial improvement and the claims of inventors, Sir Antonio Brady in the chair, Messrs. Gardner (Robertson, Brooman, and Co.), Gray, Dr. Haseltine, T. Paterson, C. G. Carttar, M. M. Harris, F. Varley, G. Odger, H. Broadhurst, and F. W. Campin, respectively representing the Inventors' Institute, London Patent Agents, the Artizans' and Inventors' Committee, and the Parliamentary Committee of Trades Congress.

It was resolved that the New Patent Bill, now in the House of Commons, be objected to (*inter alia*) on the following points :—

1. That the number of examiners and assistant examiners and the arrangements in respect to them, as stated in the said Bill, are inadequate and unsatisfactory.

2. That the referees for patents, and the duties proposed to be performed by them, are unncessary and objectionable.

3. That to supersede (as is done by clause 8) the provisional specification, would be a great evil, as it is necessary that the first step in obtaining a patent should, as now, be effected on deposit of a provisional specification; except when the applicant for a patent prefers to deposit a complete specification.

4. That it is not desirable to authorise (as is done by clause 11) an examination into anything beyond sufficiency of specification and novelty, as no human examiners can be competent to judge for all the world, as to what is to be deemed useful or frivolous in an invention.

5. That even with regard to the decision on novelty, there ought to be an appeal or appeals (which should not be simply permissive as in clause 13).

6. It is not desirable in any case to limit the duration of a patent to seven years (as referred to in clause 11), but, on the contrary, the duration of every patent should not be less than 14 years, and it is recommended that all patents should endure for 21 years without prolongation.

7. That it is highly objectionable that the duration of a patent should end with the termination of a foreign patent (as in clause 20), especially in the case of a true and first inventor, who, although a British subject, happens to be resident out of the United Kingdom.

8. That to entail absolute forfeiture of a patent because the invention is not put in practice within two years (as in clause 27, sub-section *a*), is undesirable, especially if there be an obligation to license.

9. That the obligation to license (subsection *b*, clause 27) is undesirable, unless restricted to inventions applicable to existing processes or machinery.

10. That it is not desirable that there should be any power given to anyone to compel the deposit of models (as by clause 49), as thereby considerable and indefinite expense may often be entailed on an inventor.

11. That the Bill does not (see schedules) provide for any appreciable reduction of the present high scale of stamp duties, which it is desirable (both those on the grant and those deferred) should be materially reduced; it being recommended that the total cost for obtaining the Great Seal should not exceed ten pounds. Also, that a provisional or preliminary protection should be obtainable for one pound. Likewise, that days of grace for payment of stamp duties be allowed on payment of a moderate penalty.

EXHIBITION OF APPLIANCES FOR THE ECONOMY OF LABOUR.

At this exhibition, which is being held under the auspices of the Society for the Promotion of Scientific Industry in Manchester, is a very fine collection of engineers' tools, wood working machinery, and other appliances, as may be well understood from the fact that Sir Joseph Whitworth and Co.; Sharp, Stewart, and Co.; Kendall and Gent; Smith and Coventry; B. and S. Massey; Furness, of Liverpool, and other firms of equal eminence are among the exhibitors. The second division is devoted to domestic contrivances. A large number of gold, silver, and bronze medals will be awarded, and Messrs. Richard Peacock, of Beyer, Peacock, and Co.; John Robinson, of Sharp, Stewart's; William Mather; Dr. Angus Smith; W. H. J. Traice, Professor Osborne Reynolds; and John Leigh, F.R.C.S., are the judges. The exhibition building is a fine structure, built on the same principle as the one last year, and it covers an area of over 50,000 square feet. About a dozen annexes for special purposes are attached, and not only will all the machinery be in motion, but the stoves, cooking ranges, gas making apparatus, &c., will be shown in action. We hope fully to report on this exhibition in our next.

Correspondence.

ON PROPULSION OF VESSELS BY WAVE MOTION.

To the Editor of the Scientific and Literary Review.

Sir,—Believing that it is the wish of the Inventors' Institute to guard the inventor against working upon wrong principles, but at the same time to assist him in bringing his invention to a successful issue, if it can be practically carried out, I take the liberty of addressing to you these few remarks.

On reading the paper of R. J. Browne, Esq., on the above subject, the following suggestions occur to me, to which I beg to draw his attention.

1. The rise and fall of a ship in the sea, so far as this depends upon the wave motion, the wind, cannot, in my humble opinion, be at all considered as a *reliable motive power*. How, then, would vessels progress in harbours and docks, or when the sea is calm?

2. The motion of the vessel upon the waves appears to me to be a combined oscillating and sliding motion upon the wave along the line of flotation, rather than a direct rise and fall, as stated by the author.

3. It is not possible to rely upon the water entering the air-chambers, fitted on the outside of the vessel, for producing a regular compression of the required quantity of air, so as to obtain motive power, as in most instances the ship follows the wave motion, and does not always make way in such a direction to the waves as to oblige the water to enter the chambers and to compress the air.

4. It will be seen from the above remarks that it is almost impossible to rely on the air being compressed (reduced to one-fifth of its volume) by the water entering the air chambers, as there are no means of governing the action of the water, or to regulate the quantity or speed.

5. The propulsion of vessels, in the ordinary way, depends upon the quantity of water displaced by means of paddles or screw, according to the weight (submerged body of the ship) to be displaced, and its stability.

6. The propulsion of vessels depends upon the greater or less probability of an unknown quantity of water (not governable) entering accidentally air chambers compressing more or less a quantity of air, which is more or less prevented from escaping the air-chambers before the action of compression has gone on according to the accidental motion and position of the ship.

I will not go into any calculation, as we have to deal with unknown quantities of water, unknown quantities of air, accidental speed, &c., not to speak of stability, &c.

To give motion to a body, as a weight fixed on to the ship, by the ship's own motion derived from the waves, and to transfer its effect of power back again to the ship motion as represented by Mr. Tower before the Society of Naval Architects, repose upon more correct principles in regard to the centrifugal force impressed upon a body than the principles upon which the author wishes to compress air by wave motion for the propulsion of vessels.—I am, sir, your obedient servant,

7, Lower James-street, H. Conradi.
Golden-square.

THE INVENTORS' INSTITUTE,

ESTABLISHED 1st MAY, 1862.

FORTNIGHTLY MEETINGS, DURING SESSION,
HELD AT
4, ST. MARTIN'S PLACE, TRAFALGAR SQUARE.

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PAST PRESIDENT—LORD RICHARD GROSVENOR, M.P., &c., from February, 1868, till May 1871

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The various efforts which have been made, and the numerous influences now at work to injure, if not destroy, Patent Rights; the inefficiency of the many well-intended, but ill considered, Schemes of Patent Law Reform, which have from time to time been suggested, and the tendency of which has generally been to prejudice the Inventor without advantage to the Public; together with the proceedings so essentially involving the interests of Inventors which have already taken place in Parliament, as to the propriety of abolishing Patent Rights altogether, show the necessity of an immediate and active co-operation on the part of those interested in Inventions and in Patent Property, and that an Association for the Protection and Defence of Patent Rights is urgently needed. This Institute has, therefore, been established for the purpose of uniting and organising the influence of Inventors, Patentees, and others. Its objects are:—

1st. To protect Inventors' interests, and defend the privilege of obtaining Her Majesty's Letters-Patent.
2nd. To promote improvements in the Patent Laws.
3rd. To facilitate the diffusion of information with reference to Inventions, and other subjects beneficial to Inventors and Patentees.

The qualification for Annual Members of the Institute is a Yearly Subscription of One Guinea, and for Life Members a single payment of Ten Guineas

NOTICE TO INTENDING PATENTEES.

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(*The Proprietors of the "Scientific and Literary Review"*),
21, COCKSPUR STREET, CHARING CROSS, LONDON, S.W.,
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